

The Journal

OF THE

Ministry of Agriculture

VOL. XXX.

APRIL, 1923, TO MARCH, 1924.



LONDON:
PRINTED UNDER THE AUTHORITY OF HIS MAJESTY'S STATIONERY OFFICE
AND PUBLISHED BY THE MINISTRY OF AGRICULTURE AND FISHERIES.
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THE JOURNAL OF THE MINISTRY OF AGRICULTURE

Vol. XXX. No. 1.

APRIL, 1923.

NOTES FOR THE MONTH.

THERE appears to be every prospect that the facilities which Parliament provided last Session for the landing of Canadian

Store Cattle from Canada.

store cattle in this country will be taken advantage of by farmers in Canada, and the Canadian Government is now giving advice through the Press and in other ways as to the steps to be taken in regard to this trade. It is pointed out that the essential factors are quality and price. From the point of view of quality, the Canadian Government is insisting with producers that the only way to provide store cattle of the right type and quality for the British market is to use pure-bred sires. Three or four-year-old unfinished cattle, it tells them, are of no use to the British market and would not return a profit. It advises them that the right cattle for this market should be two-year-old stores of about 1,100 lb. in weight, well-fleshed, and with the breeding necessary to take a proper finish. Quite recently, the Deputy Minister of Agriculture has announced the Government's intention of introducing a Bill to establish a quality standard for export cattle. The Canadian producer is also being told that the British market is open to take winter-fed cattle of medium weight from the middle of March to the end of May; well-finished grain-fed cattle for immediate slaughter in May and June; and grass-finished cattle from Western and Eastern Canada from August to November.

With regard to the question of the probable price of stores at the present time, the Deputy Minister is reported to have said that the average cost of transporting animals from Winnipeg into the hands of the British farmer would be £9 to £10, and that the animals might be expected to fetch about £23 10s. or £24 each.

Regarding the question of the arrangements which have been and are being made for the reception of Canadian store cattle at ports in this country, the Importation of Animals Act, 1922, will come into operation on 1st April and landing places will be available at Birkenhead, Manchester, Glasgow, Dundee and Cardiff. The port of Bristol is expected to be added to this list shortly, and proposals are also being made in respect of the ports of Aberdeen, Leith, Newcastle, Hull, Harwich, London, Southampton and Falmouth. Though it cannot be foretold whether all of these ports will be open or not, it is not anticipated that the facilities for the landing of Canadian cattle will be in any way inadequate. The provision of such facilities is not undertaken by the Government but is a matter of private arrangement, though the accommodation when provided has to be approved by the Ministry of Agriculture. The first five ports mentioned can together take 5,000 Canadian animals at a time, quite apart from the provision that may exist at them for Irish animals, and can take three lots a week. There is, therefore, accommodation for about 15,000 animals per week. The most recent estimates of numbers likely to be landed from Canada are 20,000 to 25,000 in April and May, and 100,000 altogether this year. The Canadian Government has, however, informed its breeders and feeders that the British market is capable of taking about 300,000 store cattle and 400,000 fat cattle every year.

Turning to the administrative machinery which is being set up to deal with the traffic, the Ministry of Agriculture passed two Orders on the 9th March, the first known as "The Importation of Canadian Cattle Order of 1923," and the second "The Canadian Cattle (Marking) Order of 1923," both to come into operation on the date on which the Importation of Animals Act, 1922, comes into operation, i.e., on the 1st April. The first Order sets out the general conditions as to landing, disease in a landing-place, temporary provisions in the event of disease in the Dominion of Canada, movement of the cattle from the landing-places, cleansing and disinfection of vessels, protection and feeding of animals on board ship, etc. The second Order requires all Canadian store cattle coming to this country to be permanently marked before shipment for the purpose of identification in this country.

* * * * *

IN the course of a discussion on agriculture in the House of Commons on the 5th March, the question of the insufficiency of agricultural wages was raised by

• **Agricultural Wages.** Mr. Hope Simpson. The Minister of Agriculture, Sir Robert Sanders, in reply said:—

“ In regard to the wage question—and I am glad my hon. friend referred to it—let me say that the average wage, taking the country throughout at the present time—and I only want to state facts, and not to make any comment upon them—the average wage, so far as we can ascertain, is 27s. 9d. The increase on the pre-War wage is 54 per cent. The increase in the cost of living is 77 per cent., so it is, undoubtedly, the fact that the agricultural labourer's wage is lower in proportion than it was before the War. The present means that we have for regulating the wages are the conciliation committees that were established by the Agriculture Act of a little over a year ago. They number 63 in England and Wales. Up to last autumn they were working pretty well. Arrangements were come to by 46 of the 63 committees. Up to the present time only 16 of the committees have effected arrangements, and six of these are due to expire at the end of April. What is happening now in most cases is that, when the National Farmers' Union have laid down the rate of wages for a county, that rate laid down is generally paid. In most cases the men's representatives refuse to accept that rate or to bargain on that basis. I have reason to believe that one of their reasons is that, although that rate may be laid down by the National Farmers' Union, there are a certain number of farmers in the district who, in spite of it being laid down by the Union, will continue to pay a higher rate for a time; and there has been a fear on the part of the men's representatives that if they entered into an agreement on the basis of those wages paid by the farmers, some of them would be getting, not a higher, but a lower wage. No doubt that does happen in a certain number of cases, but such cases tend to get fewer as time goes on, and although a man may pay a higher rate for a bit, when he finds his neighbours paying a lower rate he will come down to the same level. Cases occur in many counties where individuals pay a lower rate than the National Farmers' Union has laid down, and in the absence of a general agreement which might be effected, but is not being effected by the conciliation committees, such cases are

likely to get more numerous. I believe that for the conciliation committees to come to an agreement in the majority of cases instead of as at present a very small minority would be in the interest both of employers and employed, and both of the farmers and the workmen. I am only too anxious to get the conciliation committees to function again. One difficulty one has to deal with is the want of elasticity in the powers of both sides. The Farmers' Union say what they think the wage should be. The Labourers' Union say what they think the wage should be and then representatives, if they come in at all, come into the conciliation committee not as plenipotentiaries but with their hands tied on both sides. When you have these cast-iron terms arranged beforehand agreement is very difficult if not absolutely impossible. I believe if we can get these conciliation committees to function it will be a good thing all round. That is what I am trying to do.

I am considering now addressing a communication to the members of these committees, suggesting the terms on which they might meet. I thank the Hon. Member opposite for the suggestion he has made as to registering agreements. I will certainly consider that, but I am not sure how far it would tend to promote more agreement. I am not sure it might not tend to promote less agreement. I think it is quite possible that although one side might attach great importance to registering, the other side might be less willing to come to an agreement if it knew that that agreement were going to be registered. I will certainly take these considerations into account, and I hope what has been said to-night may be helpful in making things a little better in what is one of the very greatest and very saddest of the difficulties that agriculture has to deal with at the present moment."

THE circular letter referred to above in the speech by Sir Robert Sanders was sent to all Chairmen, Secretaries and Members of Conciliation Committees on 14th March, and is as follows :—

"I am much concerned at the slow progress which is being made by Conciliation Committees in arriving at agreements for wages in their districts. I am fully conscious of the difficulties of the present situation, but there are grounds for making a special effort at the present time. Although prices for some farm produce, particularly potatoes and cereals, are low, on the whole there has been little change during recent months, while for certain classes of produce prices are moderately satisfactory. From the workers'

* Particulars as to further agreements made, see p. 85.

point of view it may be said that the cost of living shows no tendency to rise, so that it is, if anything, to their advantage to come to an agreement as to wages under existing conditions.

To make agreement possible, I would particularly urge the advisability of organisations of both employers and workers allowing their representatives on the Conciliation Committees as far as possible a perfectly free hand in negotiating wage agreements. I feel somewhat strongly that on certain Committees amicable agreements would have been arrived at by the members concerned if they had not felt themselves rigidly restricted to precise terms laid down by their organisations. The essence of the Conciliation Committee system is that properly accredited representatives of the two parties should meet together with an open mind in an endeavour to come to an agreement reasonably satisfactory to both sides. A meeting between representatives whose action is limited by conditions laid down beforehand is necessarily likely to be unfruitful.

I hope, therefore, that all the Committees which have not yet reached agreements for the current year will arrange meetings as soon as possible with a determination to make every effort to arrive at settlements to cover the forthcoming season, and that the representatives will go to the meetings prepared to discuss the problems in a spirit of earnest goodwill, and, if necessary, to offer adjustments in order to arrive at a reasonable compromise. I need scarcely add that I shall at all times be glad, as hitherto, to place the services of suitable officers of this Department at the disposal of the Committees for the purpose of attending meetings in a purely advisory capacity."

* * * * *

A NOTE on the fact that the Colorado Beetle—the pest of potatoes so dreaded in the United States—has again obtained a foothold in Europe, was published in this *Journal* for February last, p. 1053. A leaflet on this pest was published as long ago as 1902, and in view of the proximity of this country to France—where the outbreak mentioned has occurred—the Ministry has prepared (1) A new edition of the leaflet, and (2) a small poster showing the insect in colour. In view of the dangerous nature of the Colorado Beetle the possibility of its finding a way to Great Britain is a serious one. It is therefore highly desirable that all who have anything to do with growing potatoes in the British Isles, or with their importation from the Continent—especially France—should be on the lookout for the beetles. In order to aid readers of this *Journal* in identifying the pest if it should make its appearance, the leaflet re-written in February is reprinted at p. 59.

* * * * *

DEPUTATION TO THE PRIME MINISTER

FROM

THE NATIONAL FARMERS' UNION, THE NATIONAL UNION OF
AGRICULTURAL WORKERS, AND THE AGRICULTURAL SECTION
OF THE WORKERS' UNION.

This Deputation was received on the 16th March by the Prime Minister who was accompanied by the Rt. Hon. Sir Robert Sanders, Bt., M.P. (Minister of Agriculture), Sir Francis L. C. Floud, K.C.B., Mr. J. C. Davidson, C.B., M.P., Mr. G. Fry.

The Deputation consisted of Mr. Harry German (President, National Farmers' Union), Mr. T. H. Ryland (Vice-President), Mr. R. R. Robbins, Mr. Henry Overman, Captain Fyfe (Parliamentary Secretary), Mr. J. B. Guild (Statistical Officer), Mr. J. F. Wright, Mr. R. B. Walker, Mr. W. Holmes, Mr. George Edwards, Alderman Beard, Mr. George Dallas, Mr. E. W. Langford.

Mr. Charles Duncan, M.P., introduced the Deputation, Mr. Walker stated the case for the agricultural workers, and Mr. Robbins made a statement on behalf of the Farmers' Union.

Mr. R. B. Walker: Mr. Prime Minister, on behalf of the Workers' side I am asked to submit to you this statement, and I will hand a copy in to you. In thanking you for the opportunity of this interview, especially in the light of present circumstances, I desire to say that the extreme urgency of the situation as we see it is the only explanation we have to offer for encroaching on your time at the present moment.

Since the cancelling of the Agriculture Act and the abolition of the Wages Board, agriculture has been dependent upon Local Conciliation Committees as the means of adjusting differences upon wages, etc., in the industry. These have been in operation for some eighteen months, and have produced various agreements. It has been evident, however, for some time that the further they have proceeded the more difficult has become their task. At the present moment there are, in fact, only agreements in 13 districts out of 65, and these being for a short period it is doubtful if they will be continued. It will, therefore, we fear, be impossible to avoid a complete breakdown of the machinery.

Briefly, the facts are that offers of wages now made by the employers are such as the workers cannot live upon, as low as 20s. 10d. per week or 5d. per hour being the terms offered. This means, having regard to the present cost of living, a much lower standard than that which obtained in pre-war days, and which by general consent constituted nothing short of a scandal in rural life. With the best will in the world to use the machinery of conciliation to its fullest extent it must be obvious that we cannot give our sanction and support to a condition of things which takes the agricultural labourers back to a position so much worse than that which has been so severely criticised in the past.

With a desire to do all that it is possible to keep our relationship with the employers on a basis of harmony and goodwill, we have met the Central body of the Farmers' Union to ascertain whether it is possible for some action to be taken nationally whereby the difficulties that have arisen, and which are likely to arise, could be removed from their local bearings and dealt with on national lines as is prevalent in other industries.

The situation is one of great seriousness, and the proposed wages and conditions have given rise to grave misapprehension, and it is difficult to say what may eventuate therefrom. The situation is one, therefore, of great urgency, as already in various counties, men are being locked out because they cannot agree to the reductions of their wages and the increase in their working hours.

We who are acting for the labourer are not actuated by any narrow interest so much as by a desire to secure national well-being by the obtaining for the rural worker conditions which will give him satisfaction in the present and hope for the future. To this end we therefore ask the Government to at once re-establish the Agricultural Wages Board.

Mr. R. R. Robbins: Mr. Prime Minister:—We are conscious of the burden of foreign and domestic problems which continue to weigh upon yourself and your colleagues, and we realise that the condition of agriculture has engaged your serious attention since you assumed office. We desire to place before you, very shortly, our views on the two issues with which you are confronted, viz. :—

(1) The fundamental question of national policy, and

(2) The question of the immediate relief to be afforded to the industry.

The first issue, Sir, is one of supreme national importance, but it may be reduced to very brief terms. That is to say, the Government must state clearly and unequivocally what it expects from the industry and whether it desires the industry to be conducted on a strictly economic or individualist basis or upon a political and social basis. If the Government intimates its desire to see the industry organised on a strictly economic basis it must be prepared to face uncomplainingly diminished food production, diminished rural population, and the consequent flocking of the rural population to the towns, the laying down to grass of all but the most fertile lands and the reversion to what is known as "ranch farming." Further, it should in justice to the industry repeal the Safeguarding of Industries Act and remove all other forms of protection and all subsidies granted to other industries in this country, as well as cease to subsidise the development of agriculture in the Dominions through the Empire Settlement Act.

If, on the other hand, the Government decides that in the interests of the State it is necessary to reduce our dependence upon imported food supplies to a minimum, to secure an output from the soil in excess of the economic maximum, and to retain or increase, at an adequate living wage, the existing numbers of workers employed on the land, then this involves the organisation of the industry upon a political and social basis and imposes upon it services of a non-economic character for which the nation must be prepared to pay.

Upon this fundamental issue we understand that you prefer to reserve final judgment pending the receipt of the Report of the Tribunal of Economists which you appointed with the full approval of all parties in the House of Commons "to enquire into the methods which have been adopted in other countries during the last fifty years to increase the prosperity of agriculture and to secure the fullest possible use of the land for the production of food and the employment of labour at a living wage and to advise us as to the methods by which those results could be achieved in this country."

We acknowledge the tribute to the importance of the issue raised by us implied in the appointment of this Tribunal of eminent economists and in the respect shown in anticipation to their judgment. At the same time, Sir, we would respectfully remind you that the progress of events since the appointment of the Tribunal has very much increased the urgency of a decision, and

we express the hope that this will be forthcoming at the earliest possible moment.

We now turn to the second issue confronting the Government, which is our primary concern to-day.

At the Old Kent Road Baths, in the course of the General Election, you stated: "I am afraid we are coming into conditions almost as bad as in the 'eighties. . . . There is one thing I do say that, in addition to the need which the actual condition of agriculture produces of doing our best to help it, it has another claim. The way in which agriculture has been shoved from pillar to post, by passing Bills and then repealing them, has enormously aggravated the position of agriculture. For that alone, we owe them some compensation." This statement of yours has been accepted by all sections of the industry as proof that you are not unmindful of the very serious difficulties in which the industry finds itself, due to circumstances beyond the control of agriculturists. Since that date, however, the gravity of the situation has increased. As you have no doubt learnt from the Press, arable farmers in Norfolk find themselves unable from their depleted resources to add to the wage of 25s. which they have recently been paying for a 50-hours' week, and are compelled to ask their workers to accept the same wage for the longer hours required to overtake seasonal work.

Such is the recommendation issued by our Norfolk County Branch to its members in order to maintain the present weekly wage to workers, and we are sure that the farmers will respond to the absolute limit of their financial resources. We are afraid, however, that in some cases their limited resources will render them unable to employ the men for more than 50 hours at the lower rate. The recommendation of the County Branch is, of course, equivalent to asking the worker to accept a reduction in his wage rate of $\frac{1}{2}$ d. per hour. The prospect before the worker is indeed deplorable, but on the other hand it is almost impossible to exaggerate the gravity of the position in which very many of those whom we represent are placed. As events are moving, the position to-day in Norfolk will to-morrow be the position throughout the whole of England and Wales wherever the farmer depends to any considerable extent upon arable farming.

If this is allowed to take place, we fear that it may have consequences which will prevent the discussion of principle in that sane and deliberate way in which alone a question of such vital national importance should be discussed; we fear that it will put beyond the reach of help many employers and many more workers now engaged in the industry, and that it must involve a serious economic loss to the community, whatever may be the ultimate decision of the country which will govern the conditions of food production and rural welfare for the future. Holding these views, we felt that we should be lacking in our duty to those whom we represent and to the country if we did not approach you, Sir, and ask you to receive this deputation so that we could lay them before your Government in this the most direct method open to us.

The crisis has not come upon us without any warning. Many months have elapsed since we saw signs of what was coming. In August of last year we sought an interview with the Minister of Agriculture of the late Government and placed before him the information which had reached us from all parts of the country. Later in the year there took place a series of conferences between the employers' and the workers' organizations on the position of the industry. These conferences were of a very frank, and we think we might add, of a very friendly, character, and raised high hopes throughout the

countryside. The facts of the position were fully discussed, but it was felt that no useful constructive discussion could proceed without a clear definition by the Government of the fundamental basis upon which they wished the industry to be conducted. It is unnecessary for us to recall the circumstances in which we failed to obtain such a definition from the late Government. Since you assumed office we have continued independently to press this question.

Pending your decision, however, on the Report of the Tribunal of Economists, we regard it as essential that some immediate temporary steps should be taken to deal with the situation now existing. Unless means can be found to cope with it, then undoubtedly we are faced with the certainty of a great addition to the number of unemployed agricultural workers, a decline of wage rates to a figure which we hesitate to forecast, and an enormous increase in the already rising numbers of agricultural bankruptcies.

On the latest official returns of prices published by the Ministry of Agriculture and taking also the official returns of the average yield per acre for the various crops, the return to the farmer to-day is only £9 per acre for wheat, about £7 per acre for barley and oats, and £10 per acre for potatoes.

Upon detailed costings which are laying before the Tribunal of Economists, and which have been compiled from independent scientific sources, these returns represent a loss of at least £2 per acre on wheat, £3 per acre on oats, £4 per acre on barley, and from £10 to £15 per acre on potatoes. These losses, coming on top of serious losses in the preceding year, are altogether beyond the depleted resources of the arable farmers in this country to cope with.

The farmer cannot shut down his farm in the way in which a manufacturer can temporarily close down his factory. There are, however, certain steps which the farmer can take to reduce his commitments, but any such steps once taken are difficult—and indeed impossible within a short period—to retrace.

On land that is suitable for laying down to grass, he adopts this means of reducing his commitments. On the land that remains under the plough, if he has the considerable capital required and the covenants of his tenancy agreement permit, he achieves approximately the same results by removing hedges, by laying field to field, and by cultivating on a less intensive scale larger areas.

But on the considerable areas of light land in this country at present under the plough which are not suitable for laying down to grass, we are afraid there is little prospect before us but to see these lands go derelict, to become game preserves, while their present occupiers are driven out of the industry either via the Bankruptcy Court, or otherwise.

You yourself, Sir, have said that you are afraid that we are coming into conditions almost as bad as in the 'eighties. In the 'eighties the situation similar to that which we have just described developed very slowly. To-day it is developing very rapidly. They present a prospect which we regard with dismay, but by ourselves we are powerless to avert it. We therefore ask you seriously to consider whether, pending a final decision on the question of permanent policy, some temporary measure of assistance cannot be devised by the Government which would at any rate alleviate the present degree of distress. Such a measure we believe is urgently required in the national interest, having regard not only to the immediate prospects of a serious extension of unemployment and destitution in the countryside reacting upon the towns, but also to the danger that the present rapid course of events, if unchecked, may seriously prejudice the future permanent conditions of food production in this country.

The Prime Minister: Gentlemen, we quite realise the serious position of agriculture. This is the second year in which your capital has been depleted, and it is obviously a very serious situation. At the time of the election I had the facts well in my mind, and perhaps you will remember I stated what was the general policy of the Government as far as I could at the time. What you seem to ask is that something should be done by the Government to prevent the fall in the production of foodstuffs. It seems to me that that is only possible in one of two ways, either by a big subsidy, the extent of which no one can foresee, or by protection.

As regards the subsidy, you know that that was tried, and that it was found impracticable, and I do not think there is any possibility of any large subvention by the State to this industry to help it to get on to an economic basis. As regards protection, I think you know as well as I do that the public is not ready for that, and you could not get a majority for it. That also seems to be shut out. I said in my letter of November the 9th that that could not be done, but I indicated some other means by which the industry might be helped. These means were in relation to credit facilities, rating, education and adjustment of prices. All these have been taken up by the Government. You know that a committee is sitting in regard to the difference in prices paid by the consumer and the prices at which the commodities are issued by the farmer. A Credit Facilities Bill is being prepared and will be introduced very shortly. The same is true with regard to rating, though that is a difficult problem, and it is possible that we may not be able to deal with that this year, though I hope we shall. But with regard to your larger questions, I do not see what can be done, or what you could expect the Government to do. You come to me and say the position is very bad, and you ask the Government to put it right. We should be only too glad if we were able to do so. We realise the position in which your industry is placed, but I do not see any practical scheme by which that can be done. As regards the Committee of Enquiry, which I hope will report shortly, I do not know what they will recommend: we will have to consider their report when it comes. I am sorry to say that on the big question, which filled everybody's mind during the war—when everybody felt the urgent necessity of increasing agricultural produce, steps were taken to secure that increase. But the area of the arable land which was thereby increased has apparently gone back to what it was before the war. I am sorry indeed to have to give so discouraging an answer. But, unless you have yourselves some practical suggestion to put to me, it comes to this, does it not? You say the industry is so bad that if there is to be proper food production at home, the Government must do it. How can that be done?

Mr. G. Dallas: What about the case of the agricultural labourers? It is obvious that their position is terrible, and it is becoming more terrible. We know that the farmer does not contend in any way that it is not. The labourer is at present right down to the bottom.

The Prime Minister: I admit that, and I cannot say anything about the dispute that you are having with the farmer. But it comes to this: Is the industry to be self-supporting, or is it not, and you have to bear in mind, after all, that what agriculture is suffering now is a direct result of the war. I think that the agricultural industry is in a worse position than almost any other industry, but they have all suffered; but the question is, is agriculture to be self-supporting or to be supported by the State? I think the latter is impossible. I would like if I could to make you realise that if there were

any way, we would like to help you, but it seems to me that agriculture must live on an economic basis.

Mr. Duncan : If it can.

The Prime Minister : If it can, and do you not think you are exaggerating a little about land going out of cultivation? From all I have gathered and tried to understand of this particular matter, I do not think it should be worse than pre-war.

Mr. German : It is much worse than in 1914.

The Prime Minister : If it can, and do you not think you are exaggerating a little, surely.

Mr. German : From the figures given me as President of the Farmers' Union and my colleagues for the Tribunal, it is obvious that it is impossible to produce cereals at the present time at anything but a loss.

The Prime Minister : But it is the fact, is it not, that few British farmers produce cereals alone.

Mr. German : Many of the East Anglian, East Yorkshire, the Wolds of Lincolnshire, Suffolk, Huntingdonshire, Cambridge farms are practically engaged solely in arable farming, and you come down again into parts of Wiltshire and Hampshire, where cereals cannot be made to pay: it is impossible. In Sherwood Forest, Nottinghamshire, we have no grass land of any value. They keep stock, and if they keep stock in fair condition up to the second week in August they starve afterwards.

The Prime Minister : If that is true, and I take your word for it, there still is no remedy except one of the two I have named. You see if one were to contemplate the State giving a subsidy to agriculture there is no end to it.

Mr. Walker : You would admit, Mr. Prime Minister, that we are faced with a very serious crisis in the industry?

The Prime Minister : Yes.

Mr. Walker : Would it be reasonable in your opinion if I suggested that surely there is a duty devolving upon the Government to deal with a crisis such as that?

The Prime Minister : But where is it to end? At the time of the war there was an attempt made, as you know, and I think that the way agriculture "has been moved from pillar to post," as was quoted by Mr. Robbins, is a very serious thing, but the attempt was given up as quite impracticable. What are the methods?

Mr. Walker : Please do not misunderstand me. I am not suggesting any method. We have come here this morning and placed what are the facts of the crisis before you, and we rather feel it is the duty of the Government, when we, who are involved and engaged in the industry, have placed these things before you—to do something. It is a serious matter.

The Prime Minister : But the Government cannot deal with that.

Mr. Walker : So that the Government cannot deal with the crisis that has arisen?

The Prime Minister : I think that, like every other industry, agriculture must be self-supporting. That is what I mean. Of course, if you ask me about wages, I think it is a deplorable thing to go back in that respect.

Mr. Walker : We are not going back: we have gone back.

The Prime Minister : They are threatening to go further back.

Mr. Walker : And the Government, in the light of that information, through you, Sir, feel that they cannot do anything whatsoever.

The Prime Minister : I do not see anything.

Mr. Dallas : Did it come to your knowledge that in discussion amongst the agricultural labourers hundreds of them and their families are seeking relief from the Poor Law Guardians?

The Prime Minister : Yes, I am aware of that.

Mr. Dallas : Men in full employment.

The Prime Minister : You do not need to say anything to make me realise how serious the position is, but I do not see any remedy.

Mr. Beard : Which means that that does constitute itself into a subsidy at the present time?

The Prime Minister : Indirectly, yes.

Mr. Duncan : The worst form of subsidy, I should say.

The Prime Minister : Yes, it takes us back to the period before the reform of the Poor Law.

Mr. Duncan : Could you say whether there has been any serious consideration given to the question of subsidising in some form the industry as it stands at the present moment? I do not know on what lines any subsidising would take place, but you suggest that there would be no limit to it. You could limit it.

The Prime Minister : When once you begin, it means the whole industry does it not?

Mr. Duncan : That would be largely a question for the farming industry to give you some information on, but there could be some limit.

The Prime Minister : I do not see it, if you once begin it. My opinion is that yours is much the more serious question, but yours is not the only industry that has come to us with the same complaint.

Mr. Duncan : The only point about that is that the other industries are showing some signs of improvement; we can see that in the various branches of the Trades Unions—we do know that it is beyond question that there is an improvement taking place. We are in touch with 2,000 branches up and down the country, and we can feel that there is an improvement taking place in industry.

The Prime Minister : I think that is true.

Mr. Duncan : It is not as fast as we would like, but it is there.

Mr. Walker : I want it to be quite clear that we have submitted our joint case, but we are not committing ourselves this morning to any particular policy in the statements we have made. We think at the moment that it is the duty of the Government, faced with the crisis that you have admitted exists, to tell us if they are prepared to deal with it. We have got your answer, very clear and plain, and very unsatisfactory from our point of view.

The Prime Minister : I realise that.

Mr. Walker : We must take that answer. We are not prepared this morning to offer any policy; we think that is the duty of the Government.

The Prime Minister : I quite understand that you should think so, but we have carefully considered the possibility of that. We do not think it is possible.

Mr. Walker : To do anything?

The Prime Minister : Not in that way.

Mr. Walker : We are not suggesting any way.

The Prime Minister : It does mean a subsidy, does it not?

Mr. Duncan : It is one of two courses, is it not?

The Prime Minister : Yes.

Mr. Duncan : On this side of the table we do not commit ourselves to any suggestion of policy, but you have explored the situation?

The Prime Minister : We have.

Mr. Duncan : And seen whether there are any possibilities in it.

Mr. Dallas : Our position is quite clear on that. As representing the labour side we are not suggesting any subsidy at all. We are confining ourselves to saying that we think a Wages Board should be established. On the other hand, our employer friends, with whom we are on the best of terms—there is no quarrel between us—are looking at it from their point of view, and they think there should be some subsidy; but we are only putting the labour point of view. We have not suggested how the money should be found at all. If it was desired by the Government, we should not be afraid to get down to that. But we say to the Government that we had a Wages Board once upon a time, and it was an immense advantage to the workers. It has gone, and it has left us in a deplorable condition. We think it would help the labourers very much indeed if that Wages Board was re-established.

The Prime Minister : A Wages Board existed in good times, that is the difference. I am really very sorry not to be able to give you a more satisfactory answer, but we are doing everything that we promised to do for the industry. The real question is: Are we prepared to say that the industry is to be conducted on an economic basis. I will say nothing about the advisability of protection, but it is obvious that it cannot be done until the country is in favour of it, but it is not to-day. I am sure it is not.

Mr. Robbins : The organising of the industry on a strictly economic basis would involve untold hardship not only upon a large number of farmers but upon a very much larger number of workers. During the transition period the distress would probably be appalling.

The Prime Minister : I have tried to understand this question as well as I can, and I am inclined to think that it is an exaggeration to say that the position is getting worse than in pre-war days. It may be bad at present, but in the long run I think it will not be so.

Mr. Walker : I wish I could make myself believe you are correct.

Mr. Duncan : It depends upon how long the "long run" lasts.

Mr. Walker : The employers are quite capable of placing their own care before you, but I came across a case the other day—I give you this as an illustration—where a man, his wife and family, when the wages at the end of the week—working a full week—were distributed amongst the family, it allowed 2½d. per meal per head of that family per day. How can people live or even exist on such a miserable pittance as that?

The Prime Minister : I agree.

Mr. Walker : It is in that crisis and that position that we want to know if the Government have any suggestions to make whereby that position can be alleviated in some way. If you say "No," I suppose, as head of the Government, we have to take your answer.

The Prime Minister : The Government have considered the matter most carefully, and we do not see how we can give a subsidy to your industry; that is what it means.

Mr. Walker : It must be clearly understood that I am not advocating anything. I have only put forward on behalf of the workers a certain suggestion.

The Prime Minister : I have to consider how the suggestion can be adopted.

Mr. Walker : Quite, and if you had submitted proposals to us we should have considered those proposals and perhaps assisted you in every possible way.

The Prime Minister: I can only repeat, I think you must be taking the worst view of the situation. I have had deputations from other industries pressing the same thing. There is really no end to it. They treat the industry in each case as if it could not be self-supporting, and you know, the financial position of the country, how unable it is to meet all these demands.

Mr. Walker: I take it you will agree, Mr. Prime Minister, in the importance of the industry to the common weal?

The Prime Minister: Yes.

Mr. Walker: I think that it is in the interests of the nation that food production should be maintained. We were told by yourself and others that we should never go back, as far as agriculture was concerned, to pre-war conditions, in the interests of the country itself.

The Prime Minister: I do not remember saying that.

Mr. Walker: It is convenient to forget sometimes, but at any rate you were associated with individuals at the time who did say that.

The Prime Minister: I admit that, but it must be admitted from the point of view of those who said that, that they tried to do it and found it impossible. There really is only one remedy, and that is protection.

Mr. W. Holmes: You stated, Mr. Prime Minister, that the conditions in the industry were good when we had the Wages Board; but is it not the fact that a Wages Board could at least prevent the chaos that exists in the industry at the present time? For instance, I find that in my experience in the county of Lincolnshire we have four or five different sets of wages all within a five miles radius, and in some cases there is a difference of 6s. or 7s. a week. If there were some means of State regulation it would probably help the employer—at least, what one might term the good employer, the person who always wants to pay a decent wage if he possibly can.

The Prime Minister: I am afraid that to press that you would have to come as a deputation by yourselves.

Mr. Charles Duncan: It is only fair to point out that the Corn Production Act fixed the limit at 25s. That is what we are pretty well down to now again; in some cases it is getting less.

The Prime Minister: The average is still above that. It is very low, taking into account the cost of living.

Mr. German: What Mr. Holmes said might be so quite easily, because you might have a circle of parishes where one or two might be good mixed farms, while the next might be very poor arable. It is quite easy to get that state of affairs under the conditions I mention.

Mr. Walker: It is a very deplorable condition of affairs.

Mr. German: I agree.

The Prime Minister: I cannot take any part in a dispute that is going on, but I am sure the farmers do not wish the wages to be brought below a subsistence level.

Mr. Walker: It is being done.

The Prime Minister: It is not being done willingly by the employers, I am sure of that.

Mr. Walker: Anyhow we have to try and exist on it.

The Prime Minister: In every business you have to take the good with the bad. Farmers had a good time during the war. That, no doubt, is taken into account now. I do hope that you are exaggerating what the future condition of the industry will be. Agriculture is not only bad in this country, but everywhere. Surely there is a hope that this will be the last year when farmers actually lose money.

Mr. Robbins : The position is aggravated by the fact that not only have wages fallen to a figure which we deplore, but the cost of living has not gone down in proportion to the lowered prices that we have been receiving for our produce. That aggravates still more the position of the worker.

The Prime Minister : I quite see that, and of course I see in your statement, which I have carefully looked through, that you mention the question of the Safeguarding of Industries Act. That does not affect the farmers' position. There is really nothing in that. If it were protecting other industries you would be right, but it is not.

Mr. Robbins : Foodstuffs are being imported into this country below the cost of production in the country of origin.

The Prime Minister : I know; but you have to take what the real feeling of the country is. Supposing we had suggested including agriculture in the Act, the country would not have agreed; at least, that is my view.

Mr. German : You say you hope that next year will be a better year. I was one who lived and worked as an agricultural auctioneer all through the '80s and the '90s, and I was absolutely in touch then. I am farming in several parts of England to-day arable and mixed land, and with this spring, from what I can foresee, I look upon this present year as going to be worse than the last.

The Prime Minister : It is no good my putting my hope against your opinion, but I had hoped the reverse.

Mr. German : I hope so also, but the mistake which the agriculturists made in the '80s and '90s was that they were always hoping. I do not see how the farmer can go on to-day. I would not like to encourage him.

The Prime Minister : Is it not a fact that, in spite of the bad position, when farms become vacant they are easily let, even to-day?

Mr. German : I absolutely admit that is the case with regard to grass farms and mixed farms; but take the Press and look at the big arable farms—you will find a lot of those to let. Only the other day I was told by the farmer on an estate I am managing that he could not stop at the present rent, although that was only 14s. an acre. I dare not face the risk of losing the tenant and re-letting these 600-acre arable farms, so reduced the rent.

The Prime Minister : The reason I said that was because I have been given figures of farms that have been to let over the whole country, and they have been taken very readily, which shows that farmers are not so hopeless as you seem to be about the future.

Mr. German : The same thing existed in the "eighties." When you have men who have only one trade they stick to that trade. They did in the "eighties," and I think they are taking the same line now.

The Prime Minister : There is a danger of that, I quite agree.

Mr. Walker : I take it that so far as the Wages Board suggestion is concerned, the Government cannot entertain the proposal in any shape or form?

The Prime Minister : I am afraid not. I do not think it is really any use in conditions such as exist to-day. I am very sorry I have to give you such a negative answer, but it is not, if I may say so, a case of breaking any pledges, because I thought about all this at the election, and I did not feel that I could give any. If you had any practical proposals on a smaller scale to put, I would be very glad to consider them.

Mr. German : I want to refer to the Committee which Sir Theodore Chambers presided over, and of which Sir Francis Floud was a member, and congratulate him on the report they drew up; but I would also like to submit

to your consideration that the rate of interest should have been put at a lower figure. Men can borrow to-day at less than the interest recommended. I do think the Cabinet and the Ministry of Agriculture, in bringing forward their bill, should seriously review the question of interest. I believe we are all agreed that the Report is a first-class Report.

The Prime Minister : That will be done, of course.

Sir Robert Sanders : Certainly.

Mr. Robbins : You are quite right, Mr. Prime Minister, in stating that only two things go to the root of the question. These other things are palliatives. They will be a welcome relief to a limited number of people, but you are perfectly right in your diagnosis of the situation. Only two things go to the heart of the problem.

The Prime Minister : I agree. Do you not agree that at the moment both are impossible?

Mr. Robbins : I cannot say; I am not in your position, Mr. Prime Minister.

Mr. Dallas : I hope the Government have not closed the door with reference to the Wages Board. Just as you are considering and exploring the whole situation with regard to, say, Sir Theodore Chambers's Report and the Report that is coming from the Committee of Enquiry, so we hope that the Wages Board will also be included in the general review. The question is surely not closed, while others remain open. I do not want you to pledge yourself in any way.

The Prime Minister : I think it is only fair to say that, so far as I understand it now, we cannot be of any help.

The deputation, having thanked the Prime Minister for having received them, withdrew.

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LINCOLN RED SHORTHORN CATTLE.

JOHN EVENS.

THE original cattle of Lincolnshire in their unimproved state were distinguished by their great size, but slow powers of fattening. About a hundred years ago their improvement was commenced by the introduction of the new type of Shorthorn which then arose in Durham and Northumberland. Three bulls were sent into Lincolnshire from Charles Colling's great sale in 1810. One of the most potent factors, however, in bringing Lincolnshire Shorthorns to their present type was the herd formed by Mr. Thomas Turnell, at Reasby, near Wragby, towards the close of the 18th century. Arthur Young, in his report to the Board of Agriculture upon Lincolnshire in 1799, says, "that Mr. Turnell has a breed of cattle which are not surpassed by any in the county for points highly valuable, or their disposition at any age to fatten rapidly. The breed originally came from the neighbourhood of Darlington." He then goes on to say that these cattle were of medium size, which he preferred to larger ones.

It is unfortunate that more minute records do not exist of the methods of breeding pursued by Mr. Turnell, but most of the best herds in the county at the present time acknowledge the influence of the "Turnell Reds." Mr. Turnell impressed his cattle with the deep cherry red colour now so much the fashion, and while slightly reducing their size from the original type, gave them greater powers of rapid fattening, and of developing the prime joints of meat.

A Dual-Purpose Breed.—The Lincoln Red Shorthorn is distinguished by length of frame, good constitution and great hardiness, capacity for milk, and great weight of carcass. The steers at 2½ years old may be expected to yield 7-8 cwt. of the best meat, and the young cows when finished milking will attain a similar weight. The females in certain herds produce after their first calf up to 4 gallons of milk per day, and as matured cows up to 6 gallons.

The tenant farmer to-day must exercise every possible economy. He cannot be too careful in the selection of cattle with which to stock his farm. He must turn to a class of cattle which he believes to be a real "rent payer." It used to be said "Booth for the Butcher and Bates for the pail," but it is claimed that the Lincoln Reds will do for both purposes.

The following are given as three illustrations: A heifer, "*Whitefoot 7th*," won in a good mixed class at the Lincoln Christmas Fat Stock Show. Her sire's dam averaged over 1,000 gallons of milk after her five calves, and her mother's dam won first twice in open Royal Milking Trials.

Missy, after winning in a dairy class, won a second at a Christmas Fat Stock Show. Her sire weighed 23 cwt., and was from a cow that averaged over 900 gallons per year. Her dam averaged 1,210 gallons per calf after six calves.

Ruby 12th, a 1,000-gallon cow, won seven money prizes at London Dairy Shows, one of her daughters won three firsts at dairy shows, and another daughter was second in a good class at a fat stock show.

An animal to be successful must have constitution. Lincoln Reds are brought up on thrifty lines, mainly wintered in fold yards with little shelter, fed largely on barley straw and turnips, exposed to the wet, and the coldest of our east winds.

About the middle of April they are turned out to get their own living, facing the biting east winds from the North Sea, and if there is any delicacy in cow or calf it is soon found out. Such is the test that has been going on for over 100 years, and surely the result must be the survival of the fittest.

Herd Book.—Before the establishment of the Herd Book in 1895, several breeders had sent a few bulls abroad on their own private written pedigrees, but the time had quite rightly arrived when the foreign buyer required some recognised proof of breeding.

Records of the leading herds, though not entered in a Herd Book, had been kept in some cases for nearly 100 years, and the breed has generally conformed to one type and colour, as shown at the yearly sale of bulls at Lincoln April Fair. Freedom from the restraint of a paper pedigree increases the usefulness of a breed during its period of development, because it enables breeding animals to be selected for merit alone, and not because they spring from any particular line of blood.

In May, 1895, was issued the first Herd Book, containing about 100 members. To-day there are 500 members from all parts of England, and the census of pedigree stock recently published by the Ministry of Agriculture shows that this is the second largest breed of pedigree cattle in England, Shorthorns of course being first.

In the first Herd Book, herds were entered collectively. Bulls were always individually entered and numbered, and when the



FIG. 1.—Lincoln Red Shorthorn Bull. Horkstownian Premier.

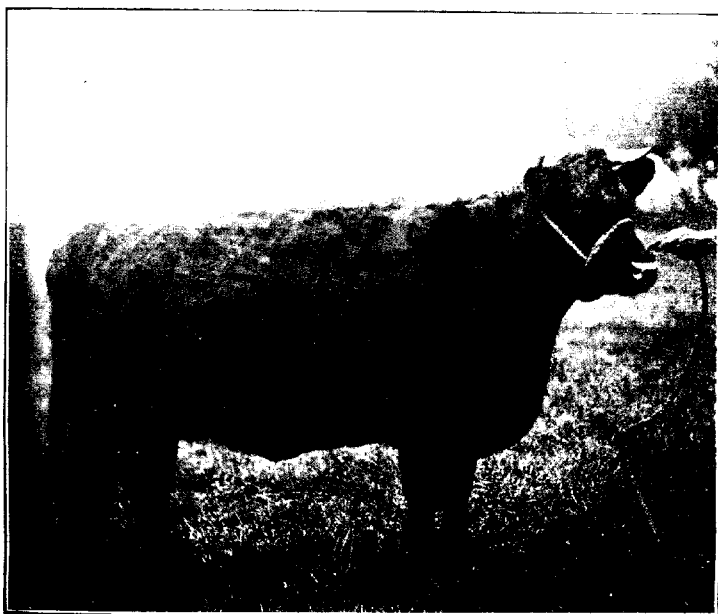


FIG. 2.—Lincoln Red Shorthorn Heifer. Saltfleet Red Rose.

Association was firmly established it was made compulsory to enter all females individually.

• Being all red the cattle are wonderfully alike, especially as calves and yearlings, so they are all earmarked within a month of birth, on a plan adopted by the Association.

Sale of Bulls.—The annual show and sale in Lincoln during the Lincoln April Fair is probably unique in the history of cattle breeding. About 400 young red bulls, chiefly 12 to 16 months old, are sold in four hours, half of them going into distant counties of England. At the 27 annual sales 6,606 bulls sold have realised £247,872, an average of about £37 10s. each. During the last three years this one annual bull sale has realised over £60,000, or an average of over £20,000 a year, which has gone chiefly into the hands of the Lincolnshire farmers. This shows what an asset the breed is to the county.

During the last three years classes for Lincoln Reds have been included at the Smithfield Show. Unfortunately they have been badly supported, the explanation being that up to the last year or two practically all our herds have been owned by tenant farmers, for whom the expense and trouble of showing is too great.

Beef Production.—Most of the breeders practise rearing and fattening. The general custom is for the cows to calve in the spring and rear one or two calves out at grass, these being weaned in the autumn. The dams are then wintered cheaply on barley straw and turnips, the best of them being sold to go into town dairies at about the third calf. The young steers are kept nicely going on to make beef at about 2½ years old.

Dairying.—In order that buyers may know which are chiefly beef herds and which dairy herds, the Herd Book shows this year for the first time by an asterisk the names of those owners who are breeders of dairy cattle and members of milk recording societies. There are 58 of these.

Dairying is not much practised in Lincolnshire, owing to the dry climate, and the fact that it is a thinly populated county far from the large centres of consumption.

The Lincoln Red is nevertheless a breed that can hold its own in any company as a milk and butter producer, and still feed into a good carcass of beef when finished at the pail, breeding steers in the meantime that are good graziers and feeders.

Milk records for a herd of Lincoln Reds have been published for over thirty years—one of the longest series in the country.

The breed has a long list of successes in milk and butter tests all over the country. The British Dairy Farmers' Association's Journal, 1921, says, with regard to the London Dairy Show, "The Lincoln Red Heifer class was an exceptionally strong one; it is notable that the average milk yield of these heifers was slightly over 4 galls. per day, the highest yield for heifers in the Hall." Again the same Journal for 1922 says, "This class averaged more milk than any other class (heifer) in the Show; the quality was excellent." At the same Show the average of mature cows was as follows:—

		<i>Average Milk Yield.</i>		<i>Fat.</i>		<i>Total Points.</i>	
		lb.		per cent.			
Lincoln Reds	...	60.93	...	3.51	...	123.19	
Friesian	...	61.86	...	3.35	...	120.23	
Non-pedigree Shorthorn	...	50.71	...	4.05	...	108.13	
Pedigree Shorthorn	...	50.21	...	3.98	...	107.63	

Perhaps the best win of the breed was last October, when Lord Bledisloe's Challenge Bowl (200 guineas) was awarded to the Lincoln Red Shorthorn Association for the best six all-round dairy cows exhibited at the London Dairy Show, 1922. This Cup is awarded to the six cows of any breed gaining the most points in milking trials and on inspection combined.

Export Trade.—Few animals have gone to South America, where the Shorthorn and the Hereford seem to hold the field. The largest numbers have been sent to South Africa, Chile and Brazil, where the whole-coloured dark red animals seem to be eminently suited to the hot climate as being less likely to attract ticks and flies. At the foot of the Matoppos, in Rhodesia, on the farm of the late Cecil Rhodes, the writer saw a wonderful object lesson a few years ago. About 50 or 60 sucking calves sired by Lincoln Red bulls were the produce of ordinary scrub cattle. These calves were bigger and heavier than their mothers; others had gone on well to the second and third cross. A Lincoln Red bull put to Africander cows, breeds a bull for which there is a good local demand.

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THE ENGLISH SUGAR BEET CROP.

CONTRACT CONDITIONS FOR GROWERS IN 1923 AND NOTES ON CULTIVATION.

R. N. DOWLING, N.D.A., P.A.S.I.,
Agricultural Organiser for Nottingham.

FIFTEEN thousand acres of land will be under the sugar beet crop this year in the Midland and Eastern Counties, 9,000 acres being grown for the Cantley Factory, in Norfolk, and 6,000 acres for the Kelham Factory, near Newark. Some two thousand farmers have signed contracts for areas averaging $7\frac{1}{2}$ acres. Thus it will be seen that the crop is slowly but surely making a place for itself in the rotation and is now looked upon as a practical business proposition.

The experience of growers during the last two seasons has been interesting, for it has confirmed in a very definite manner the results obtained in a good deal of the early experimental work in this country, and also certain facts relating to sugar content and crops as affected by seed per acre, cultivation, soil and climatic conditions.

Quantity of Seed per Acre.—In view of all the published advice and the definite instructions sent out by the factory authorities as to the quantity of seed required per acre, one would imagine there was no need for further comment in this direction. This, however, is far from being the case, and it is most important that growers should realise the necessity for using enough seed, as the sowing of too small a quantity has undoubtedly been responsible for numerous thin crops.

One finds over and over again that where a thin seeding has been used, only a 60 per cent. or 70 per cent. "plant" (or number of plants per acre), as compared with what should be the case, has resulted. This then is one direct channel where a loss of crop is experienced, and can very easily account for a diminished return per acre.

Trials to test the quantity of seed to sow, were carried out by the writer in 1912 on numerous farms in the Western and Eastern Counties of England. Plots were drilled at the rate of 12, 15, 18, 20, 25 and 30 lb. per acre. In 1912 the season was very wet, and in consequence 20 lb. of seed proved to be

more than was necessary in the Western Counties, and crops that were singled late were difficult and costly to work. It was found, after allowing for possible difficult seasons and the probability that when grown commercially the distance between the rows would tend to get less, and also allowing for depredations by insects and other pests, that 15 lb. of seed per acre was a suitable quantity to sow on average soils and under average conditions.

It is interesting to note that under Clause 6 in the form of contract issued by the factory, it is laid down that 15 lb. of seed per acre shall be obtained from the Company at 6d. per lb. and that all seed supplied shall be used on the stated area. There are cases, *e.g.*, on strong land, where more seed should be used, and it is often in these very instances that it is difficult to get growers to appreciate the importance of this point. It is quite a common practice on the Continent to use 25 to 30 lb. of seed per acre, and yet one finds some farmers here who would try to use as low as 5 to 6 lb. A thin "plant" not only means a smaller crop in tons per acre, but it tends to reduce the sugar content of the beets and, of course, "gaps" mean "rubbish," so the grower loses on all counts.

Distance between Drill Rows.—Farmers are gradually learning that sugar beet, although allied to the mangold family, must not be treated exactly on the same lines, *e.g.*, the practice of drilling on the ridge with farmyard manure applied direct, is giving way to the more suitable method of applying dung in the autumn and ploughing in early, or even applying to the preceding crop, and drilling on the flat with a smaller distance between the rows.

Practical experience on a large scale has confirmed experimental evidence that wide drilling is responsible for a further reduction of possible crop, and it is very important that the drills should be as close as possible consistent with the soil and other conditions.

The roots of sugar beet are not generally large; the average will only weigh about 1½-2 lb. when topped; it will therefore be seen that closer rows will mean many thousands of extra plants per acre and a proportional increase of crop in weight and sugar. To be able to drill at 16 in. to 18 in. between the rows, it is necessary to have a horse hoe suitable for the work, and this fact has probably deterred some growers from altering the old practice of 24 in. and 30 in. work done for mangolds.

Many experiments have demonstrated that early and continuous hoeing when properly carried out is directly responsible for an increase in crop.

Rolling.—The very great value of using the roller to encourage early and even germination must not be lost sight of. By judicious rolling it is possible to overcome to a great extent the effects of a dry spell.

Hoeing.—Horse hoeing must be early, thorough, and continuous until it is no longer possible owing to the leaves closing up the rows. It is advisable to have an implement that will allow early hoeing, and keep the soil well up to the plants, yet without smothering the young seedlings. There are excellent light draught horse hoes of Continental, Canadian and American manufacture fitted with disc coulters for the first early hoeing and replaceable by duck foot and angle tines as required. These can be obtained through the factory authorities at a reasonable cost.

These horse hoes are capable of doing four rows at a time and are fitted with a driver's seat and a clever device for moving all the tines as required with ease, so that any irregularity of the rows can be allowed for. They are on the same principle as those used in most of the large sugar beet areas all over Europe, and are a type that might prove very useful for other purposes in this country. It is anticipated that similar hoes will be turned out by English makers before very long, even if there are not some on the market already.

Value of Early Singling.—Perhaps one of the most important points in connection with growing a successful sugar beet crop is that of early singling. It was one of the most difficult problems that confronted the writer in the early experimental days and remains so to this day. Large numbers of farmers have yet to learn the supreme importance of singling when the plants are really small.

Horse hoes should be started directly the plants can be seen in the row, and bunching or chopping out and singling as soon as the plants have formed four leaves, when they are but 1 to 1½ in. in height. Even then it is difficult in a good growing season to get the crop done before the plants have grown to such a height that it is difficult to do the work properly. It has been conclusively proved in carefully conducted experiments that late bunching and singling may reduce the crop by several tons per acre. Further, the work is more difficult and costly when done late.

Sugar Content.—The average amount of sugar in the beet crops of 1922 was $16\frac{1}{2}$ per cent. Large numbers of beet crops, however, recorded 17 and 18 per cent., and as high as 19 and 20 per cent. was reached in a few cases.

For many years it was thought that the climatic conditions prevailing in this country would prevent the growing of sugar beet from becoming a commercial proposition. The averages obtained at the sugar factories have entirely dispelled any misgivings on the score of climate.

It has always been assumed that plenty of sunshine is essential to ensure a high sugar content in the root, but at the Kelham factory in 1921 the average sugar content for 25,000 tons of beet was 15.9 per cent., whereas in 1922 for the same quantity the average was 16.74 per cent.

Now it was generally thought that the hot summer of 1921 was ideal from the sugar content point of view, and as a matter of fact very high percentages were recorded when the beets started coming into the factory. It will be remembered, however, that rains set in during the early autumn, which started second growth in the crops and caused a most extraordinary drop in the crystallisable sugar. Beets from one farm were registering 18 per cent. but the same crops dropped to 16 per cent. before delivery was completed.

The season of 1922 was, as everyone knows, a very overcast and sunless one, and the crops grew longer. Conditions prevailed that were generally considered very unfavourable for sugar production, and yet the average sugar content came out to more than in 1921, thus confirming the early experiments showing that so far as climatic conditions are concerned sugar beet is a suitable crop to grow in the district covered by the factories.

Localities and Attitude of Farmers.—Large areas of sugar beet have been grown in the potato districts of Cambridgeshire and Lincolnshire, where farmers are used to intensive forms of cultivation and also to growing crops under contract. Farmers in these areas have been quick to recognise the fact that sugar beet is not only a paying crop, but that every acre of beet will probably mean an acre less under potatoes or other similar crop, thus directly assisting in regulating the supply and consequent market price for such crops. This effect is hardly noticeable at present, but if further factories are erected it may make a big difference.

A curious fact is that farmers who lived in close proximity to the factory were not nearly so keen to grow as those at a

greater distance. Possibly the type of farming had something to do with it, but apparently the desire to take up contracts has been much keener this year, and, rather unfortunately, it has not been possible to accept the whole acreage offered, as those who grew before had a prior right to a similar acreage, and the factories can only deal with a given quantity of roots. As other factories are erected, the crop will probably become more and more a definite part of the rotation and the bulk will be grown nearer home. Already, however, there is a very decided change of attitude and farmers are realising that although there may not be a fortune in the sugar beet, it is a crop that has many advantages, *e.g.*, the market is certain and it is a ready money crop. It demands good cultivation, but leaves a residual value which is making a mark where the crop is grown.

The Principle of Co-operation.—Factories run on co-operative lines with farmers as shareholders are not uncommon on the Continent, and it is by no means improbable that the co-operative system may be introduced in this country. It is of more than passing interest to know that the principle is creeping in and is taking a very definite form this season.

When the Kelham factory was started in 1921 a flat rate per ton of washed and topped sugar beet at the factory was offered, *i.e.*, a price per ton net after the beets had been washed at the factory.

In 1922 there was offered a price per ton plus one shilling for each half per cent. of sugar over $15\frac{1}{2}$ per cent. This was done partly to encourage men on light soils where smaller crops, but with a high sugar content, might be expected, and also to promote methods of good cultivation that would tend to increase the sugar in the roots.

For the season of 1923 the offer to farmers definitely makes the grower a participator with the factory in the ordinary trade risks. Under the contracts submitted for this season, the price to be paid for beet will be based on the net average price received by the factory for the sugar produced, while the variation for sugar content has been increased from 2s. to 2s. 6d. for each one per cent. of sugar content over $15\frac{1}{2}$ per cent.

Contract Conditions.—The contract conditions for the 1923 crop are as follows:—

1. *Price.*—The price to growers for properly topped and washed beets (tare deducted) *delivered into the factory sidings or flumes* will be 40s. per net ton, subject to the following:—

(a) *Sugar Price*.—One shilling or a fraction thereof per net ton added for each one shilling or a fraction thereof of "the average sale price of sugar" (as hereinafter defined) per cwt. over 40s., and one shilling or a fraction thereof per net ton deducted for each one shilling or a fraction thereof of such price less than 40s.

(b) *Sugar Content*.—Two shillings and sixpence or a fraction thereof per net ton added for each one per cent. or a fraction thereof of sugar content over 15½ per cent., and two shillings and sixpence or a fraction thereof per net ton deducted for each one per cent. or a fraction thereof of such sugar content less than 15½ per cent.

2. *Freight*.—The Company will pay all rail or barge freight on behalf of the grower, and deduct the same from the grower's account. If not so deducted, such freight will be due and payable to the Company on demand.

3. *By-Products*.—The grower shall have the option of purchasing from the Company dried beet pulp to an amount equal in weight to 5 per cent. of the total net weight of beets delivered by him, at the price of £5 8s. per ton *ex factory*, provided that such option is exercised in writing to the Company before the 1st August, 1923, and that the grower thereby undertakes to use upon his own farm the dried beet pulp so purchased. If the grower has not exercised such option before the said date he shall not be entitled to purchase dried beet pulp manufactured by the Company except in the open market.

4. *Advances*.—The Company is prepared to make to growers who may desire to avail themselves of the opportunity and who make written application therefor, advances upon their crops before delivery not exceeding £5 per acre in all. No advance shall be made to a grower unless in the opinion of the Company the condition of his crop warrants it, and not more than £2 10s. shall be advanced before the crop is singled to the satisfaction of the Company, while the remaining amount shall not be advanced before 1st August, 1923. The amounts of such advances with interest at the rate of 5 per cent. per annum shall be deducted by the Company from the grower's account before making any payments in respect of beets delivered, and if not so deducted, shall be payable to the Company on demand.

Attention should be drawn to Clause I (a) which gives the improvement in price when sugar is more than 40s. per cwt., but also to the rate of deduction in the event of sugar being less than 40s. per cwt. As prices stand to-day, there is a good prospect of a considerable improvement on this basis price, but it should be clearly understood that in the event of any unforeseen circumstance causing a decided drop in the price of sugar, then proportionately there will be a fall in the price paid the

farmer for this crop. A very ingenious table for calculating the price due to a grower is given on the back of the contract issued to each farmer.

The following figures are quoted as an example. Let us assume the price of sugar to be 49s. per cwt., and the average sugar content of beet $16\frac{1}{2}$ per cent. A glance at the table shows that under these conditions a grower would receive 51s. 6d. per net ton of beet delivered to the factory. Should the price of sugar vary up or down, the farmer will proportionately lose or gain according to the defined scale.

In conclusion, the writer would like to record his appreciation of the help given him by Capt. J. N. Mowbray, Agricultural Officer for the Kelham Beet Sugar Factory, who kindly discussed the various points under consideration and made helpful suggestions.

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FATTENING PIGS OUT OF DOORS.

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So much has been written recently about open-air pig keeping that there seems to be a little danger of losing sight of some of the essential points in feeding practice.

Pigs are generally fattened for slaughter before they have attained full growth, and the food which they receive is utilised in the following directions:—

- (1) Maintaining the vital functions of the body—digestion, blood circulation, etc.
- (2) Providing material to repair the wear and tear of the animal's mechanism.
- (3) Producing heat to maintain the animal's body at normal temperature.
- (4) Providing the energy used up by the animal as it moves about.
- (5) Providing various substances for "growth"—bone, muscle, etc.
- (6) Providing the raw material from which the pig makes and stores the fat in its carcass.

Of all these directions in which the food is utilised, only 5 and 6 are productive, that is, they are the only parts of the food consumed which produce something of money value. The rest, from the farmer's point of view, represent waste, and though they cannot be done away with, it is to his interest that they should be reduced as low as possible.

As regards (3) and (4), it is clear that the amount of food required to maintain the heat of the animal's body and to provide it with the energy necessary for moving about is directly affected by the conditions under which the animals are kept. If they are exposed to cold, and particularly cold, *wet* conditions, the natural heat of the body can only be maintained by an increased diversion of food for this purpose. This applies to all animals, but particularly to the pig, which has very little protective body covering as compared with sheep or even cattle. Similarly, an animal more or less at rest uses up much less food than one which is continually moving about.

It is not so obvious that 1 and 2 are under the farmer's control, but to a certain extent they are. Generally speaking, the older an animal is, the more food is used for these "maintenance" purposes, and the waste (from the point of view of the farmer's pocket) involved by using food in these directions is reduced to a certain extent by fattening the animal at an early age, and avoiding what may be called a "store" period. From the point of view of food economy, it is therefore clear that the sound policy in fattening pigs is (a) to keep them going from the start, as increase in weight is secured with a smaller consumption of food in young animals than in old, (b) to keep them indoors, or at any rate not exposed to inclement conditions, and (c) to keep them at rest as much as possible.

Other considerations have, however, to be taken into account. First of all, a certain amount of exercise is necessary to the health of any animal. Then experiments which have been conducted show that some foods commonly fed to pigs are deficient in certain accessory food constituents, termed "vitamines." These constituents are abundant in green food, and pigs fed out of doors are not likely to suffer for lack of them, but it is possible that pigs fed always indoors might so suffer.

In view of the many different points to be taken into account, it seems desirable to ascertain as definitely as possible the importance of each. Naturally the various factors concerned have different degrees of importance in different classes of animals, *e.g.*, breeding sows, fattening pigs or young stores. The following notes describe an experiment with young fattening pigs.

Object and Plan of the Experiment.—As a preliminary to the investigation it was decided in the first place to test at the College Farm whether the greater exercise and the green food secured by outdoor pigs are of sufficient value to compensate for

the waste of food involved by the increased exposure and movement. Farther, the experiment afforded a chance of ascertaining whether young pigs fed on an ordinary mixed ration of meals are likely to suffer from lack of vitamins. Two litters of pigs, 22 in all, were divided when weaned at eight weeks old into two equal lots, half of each litter being put into each lot. The pigs were all sired by the same Large Black boar, and the two dams were closely related pedigree Large Whites. The sows had been sty-fed but ran out for a short time daily in a small grass paddock. Up to the time of weaning, none of the young pigs had been allowed out of the sty.

After weaning and the division into two lots of eleven each, Lot I was placed in a part of the stackyard, about 40 yards square, fenced off for the purpose. A considerable area of this was covered with grass, and in addition there was in parts the usual miscellaneous herbage found in stackyards, including weeds of all kinds, "volunteer" corn, and in one part a fair number of young potato plants growing among the debris of potato clamps which had been situated there in the previous winter. For shelter, a corrugated semi-circular steel shelter, open at one end, was provided, but except in wet weather this was rarely used, the pigs generally settling for the night under the lee of a small hay stack situated in the enclosure. This provided another source of food for the pigs, if they had cared to use it, though they were never observed to pull out any of the hay.

Lot II was kept entirely in a small sty of the common lean-to type with a small open court attached. This had a brick floor, and great care was taken to prevent the pigs securing green food, or any material whatever beyond the rations given below.

Both lots received exactly the same meal rations, and the only difference between the two lots was that the pigs in Lot I were kept in the open, and had plenty of exercise and a considerable variety of green food in addition to the allowance of meals. The area at their disposal was, of course, not large, but at no time was the enclosure eaten down so bare that they had any difficulty in securing green food. The food given was roughly adjusted in quantity to what the pigs would clean up readily. It was carefully weighed, and there was no obvious difference between the appetites of the two lots.

Rations.—At the commencement of the experiment the pigs, which averaged 45.7 lb. live weight, were receiving 2.2 lb. of meal per day. On 2nd October, when they averaged 198 lb. live weight, they were receiving 6.7 lb. per day. For the first

two months the composition of the mixture of meal was as follows :—

Thirds (coarse middlings)	...	...	...	15 parts.
Decorticated Earthnut Cake	...	...	...	3 „
Fish meal...	...	...	...	2 „

The fish meal was reduced after the second month of the experiment to 1 part in 19 for the third month, after which it was discontinued altogether. The proportion of earthnut cake to thirds was 1 to 5 right through the experiment.

Raw potatoes at the rate of 2 lb. per head per day were introduced into the ration at the end of August, and continued for ten days. The amount of meal was reduced while potatoes were being fed, the basis taken being the assumption that 4 lb. of potatoes would be about equivalent to 1 lb. of meal.

The pigs were fed three times daily, the food being mixed with water and given in the form of a slop. The earthnut cake was soaked in water for a day or so in advance. It absorbed water readily and after a few hours could easily be stirred into a paste and mixed with the other foods. The thirds and fish meal were also mixed with water a short time before feeding, but separately from the earthnut cake.

The composition and prices of the foods used are given below. The decorticated earthnut cake used was of very high quality, and was in the condition of flakes, very suitable for the purpose. For the first week after weaning the pigs were given a little dried milk in addition to the food mentioned above, a total of 12 lb. being fed to each lot.

					<i>Thirds.</i>	<i>Decorticated Earthnut Cake</i>	<i>Fish Meal.</i>
					per cent.	per cent.	per cent.
Moisture	...	...	...	...	12.8	9.4	12.3
Ash	...	...	...	...	3.5	4.4	27.3
Albuminoids	...	...	...	...	16.6	15.1	57.4
Fat	...	...	...	...	3.4	15.0	2.0
Carbohydrates	...	...	...	...	58.2	24.0	1.0
Fibre	...	...	...	...	5.5	2.1	Nil
					100.0	100.0	100.0

Price per ton delivered at Aber
Station £9 5s. £11 5s. £22

The pigs were weighed at intervals as shown in the table on p. 31, which also gives the average daily increase, and the average daily ration per head.

Summary.—The results may be summarised as follows :—

	<i>Period of Experiment June 12 - October 2, 1922.</i>	<i>Average total increase in live weight.</i>	<i>Average daily increase per pig.</i>	<i>Total weight of meal consumed per pig.</i>	<i>Weight of meal to produce 1 lb. live weight increase.</i>
Lot I.	days.	lb.	lb.	lb.	lb.
Indoor Pigs ...	112	153.14	1.37	499	3.26
Lot II.					
Outdoor Pigs...	112	151.55	1.35	499	3.29

Period.	Average ration of meal at middle of each period.		Average increase per pig per day for same period.	
	Lot I. Outdoor.	Lot II. Indoor.	Lot I. Outdoor.	Lot II. Indoor.
	lb.	lb.	lb.	lb.
June 12-June 27, 15 days ...	2.6	2.6	0.95	0.93
June 27-July 9, 12 days ...	3.0	3.0	1.12	1.36
July 9-July 24, 15 days ...	3.7	3.7	1.10	1.33
July 24-Aug. 8, 15 days ...	4.6	4.6	1.98	1.60
Aug. 8-Aug. 22, 14 days ...	5.0	5.0	1.58	1.44
Aug. 22-Sept. 4, 13 days ...	5.6	5.6	1.55	1.75
Sept. 1-Sept. 18, 14 days ...	5.8	5.8	0.90	1.43
Sept. 18-Sept. 25, 7 days ...	6.2	6.2	1.49	0.91
Sept. 25-Oct. 2, 7 days ...	6.5	6.5	1.71	1.36

Discussion of Results.—It is obvious that both lots of pigs made very satisfactory increases, and the amount of food (about $3\frac{1}{4}$ lb.) required to produce 1 lb. of live weight increase is well below the average. This is doubtless largely due to the fact that the pigs themselves were of a very good type. The first cross between the Large Black and the Large White is a very useful commercial pig.

Considered from a financial point of view the results were also very satisfactory. Shortly after the end of the experiment all the pigs were sold at 9d. per lb. live weight, and the cost of the food per lb. of live weight increase was hardly 4d.

Probable Error of the Results.—In considering the results of experiments such as these, it is necessary before attaching importance to any difference between the lots to remember that any lot of animals, treated in absolutely the same way, would show a certain amount of variation in results. By weighing each animal separately right through the experiment it is possible by calculations, which need not be described here, to ascertain the amount of this unavoidable variation. In this experiment the pigs were so weighed, and the "probable error" calculated. It was found to be in the case of the indoor lot ± 2.25 lb. and in the case of the outdoor lot ± 2.07 lb. Roughly translated into ordinary language, this means that no importance can be attached to any difference of less than 5 lb. between the average live weight increase of the two lots. As the actual difference between the average live weight increase of the two lots was only about $1\frac{1}{4}$ lb., the two lots may be considered as having put on identical increases. The low probable error in the experiments here discussed was probably due to the fact that the pigs were all of such similar breeding, and that progress in every case was steady from birth.

General Conclusions.—The results clearly show that the indoor lot did at least as well as the outdoor lot in spite of the fact that the latter had, in addition to the common ration, a small but not unimportant quantity of food in the form of grass and other herbage.

The appearance of the pigs throughout the experiment fully confirmed this result. The indoor lot looked particularly well right through the experiment. Their skins were clean and sleek, and they had every appearance of thriving animals. The outdoor pigs did not look nearly so well, their skins were rougher, and actually they looked worse than they really were. The indoor pigs led as regards weight throughout the experiment.

The results point clearly to the following conclusions:—

(1) The indoor lot of pigs did not suffer from any lack of "vitamines," and as their ration was probably less varied than ordinary farm feeding, there must be much less danger of pigs suffering from lack of "vitamines" than is often suggested. This confirms results recently described by Dr. Crowther in Bulletin No. III published by the Research Department of the Olympia Agricultural Company, Ltd.

(2) The extra energy used by the outdoor pigs in ranging about dissipated all the extra food material obtained in their green ration, and counterbalanced any special value which the exercise and green food may have had. Possibly part of this was used in providing the greater amount of heat required to maintain the body temperature, but as the experiment was confined to the summer months, the difference between the outdoor and the indoor pigs could not be particularly great in this respect. Had the experiment been continued through the winter it is only reasonable to suppose that this last factor would have played a more important part.

Labour and Manure.—The questions of labour and manure have not been touched upon. In the experiment described, the labour in preparing the food and feeding the two lots was exactly the same. The indoor lot required additional labour in that the sty had to be cleaned out daily. Against this, however, must be set the cost of fencing and ringing the outdoor pigs. As regards the value of the manure it might be claimed that in the case of the outdoor lot the manure was applied directly to the land, and no waste would result such as is inevitable in storing manure under any conditions. On farms in North Wales at any rate no particular value can be set on this because the manure is more required by the arable land than by the pasture.

This preliminary experiment only deals with one aspect of outdoor pig keeping, but it will have served its purpose if it has demonstrated the above conclusions to those who might be led to suppose that unlimited exercise and exposure to all kinds

of weather are good in themselves, and that something more than an ordinary mixed farm ration is necessary to provide the "vitamines" required by young pigs.

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WHITE CLOVER.

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WHITE CLOVER (*Trifolium repens*) was first cultivated as a seed crop in Holland, and it is often spoken of as Dutch clover. It is indigenous throughout temperate Europe; and in Britain occurs as a wild plant far more abundantly and on a greater variety of soils than does red clover. It is an important and abundant constituent of the best old grasslands of the country; on the famous fattening pastures of Leicestershire, in the Blackmore Vale and elsewhere it often contributes as much as 25 per cent. to 35 per cent. of the herbage. It is also to be found on poorer classes of pasture, occurring both near the sea and on certain types of hill grazing. It is probably not too much to say that under proper manurial treatment there is hardly a soil in Britain that cannot be made to carry white clover.

Description of the Plant (*see Plate*).—White clover is generally a fairly, sometimes a very long-lived perennial. It has a well-developed tap root, but is otherwise shallow-rooted. It differs fundamentally from red and Alsike clovers in having solid stems which creep on the surface of the ground and which root freely so that single plants are able to colonize areas a foot, or in extreme cases a yard, in diameter.

White clover does not, therefore, produce the same abundance of top growth as red and Alsike, and, when cut, the hay consists mainly of flower stalks and leaves. The flower heads, which are smaller than those of red and Alsike clover, are produced on long stems and are white or pinkish.

A considerable number of forms of White clover are to be met with; these do not differ from each other in well-marked characteristics. From an agricultural point of view it is important to make the following classification:—

1. Indigenous or Wild White clover.
2. Ordinary White or Dutch clover of commerce—
 - (a) grown for seed in England.
 - (b) „ „ abroad.
3. Ladino: "Giant" or "Mammoth" White clover.

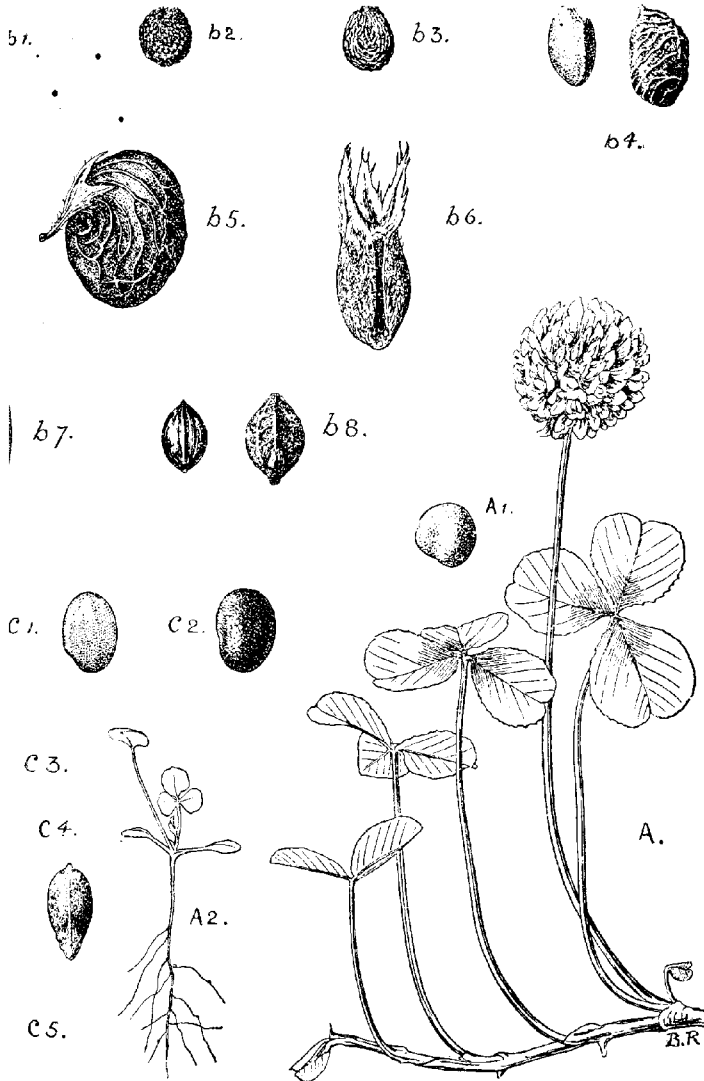
1. *Indigenous or Wild White Clover*.—Wild White differs in no fundamental morphological characteristics from white Dutch clover. The plant is, however, a much longer-lived and more hardy perennial, with a more densely creeping habit, producing numerous long runners and a dense carpet of small leaves; its flower heads are often smaller and its seeds usually smaller than those of white Dutch.

2. *Commercial White Dutch Clover*.—White Dutch clover is grown for seed in Central Europe, Russia, Holland, Britain, New Zealand and America.

Much of the commercial seed does not give rise to a long-lived plant; indeed, white Dutch frequently only produces plants of biennial duration. There is evidence for thinking, however, that English grown white Dutch clover sometimes gives rise to fairly long-lived plants; this seems especially to be the case when the seed has been harvested from leys which have been down for more than four years. The probable reason is that on such leys a certain amount of Wild White clover is likely to have established itself unsown on the sward, and to have contributed to the seed harvest. New Zealand white clover also is said to give rise frequently to plants of considerable permanence strongly resembling the plants of Wild White clover in habit. It is not at all unlikely that this is so, since in New Zealand the seed is often harvested from leys of considerable age.

3. *Ladino: Giant or Mammoth White Clover*.—This clover is cultivated under irrigation in Lombardy, and in this country is sometimes put on the market as Mammoth White clover. Under suitable conditions it grows to almost twice the size of white Dutch, but is probably not a valuable plant under our climatic conditions. It is not so resistant to cold as ordinary white clover, and trials have shown that it frequently does not come through the winter well in this country.

Description of the Seed and Impurities (*see Plates*).—The seed of wild white clover does not differ from that of white Dutch in any absolute character. It is, however, usually smaller, and samples often contain more "hard" seed. The seeds of white clover are similar in shape to those of Alsike, but they are generally very slightly smaller. The colour is, however, different, for the seeds of White clover are pale yellow to pale brown. Good samples should have a fairly bright appearance; in badly harvested or old samples the colour becomes a dull uniform reddish brown.

WHITE CLOVER (*Trifolium repens*, L.)

A. In flower (nat. size); A1. Seed (x 8); A2. Seedling (nat. size).

ise-ear Chickweed (*Cerastium vulga-*
um, L.)
 ckweed (*Stellaria media*, L.)
 ser Stitchwort (*Stellaria graminea*, L.)
 e's Foot Cranesbill (*Geranium moll*, L.)
 foil (*Medicago Lupulina*, L.)
 d Madder (*Sherardia arvensis*, L.)
 wort Plantain (*Plantago lanceolata*, L.)

b8. Sheep Sorrel (*Rumex Acetosella*, L.)
 C1. Yellow Suckling Clover (*Trifolium dubium*,
 Sibth.)
 C2. Bird's Foot Trefoil (*Lotus corniculatus*, L.)
 C3. Cinquefoil (*Potentilla reptans*, L.)
 C4. Wood Rush (*Luzula campestris*, Br.)
 C5. Crested Dogstail (*Cynosurus cristatus*, L.)

White clover usually contains rather a higher percentage of hard seed than do other clovers. Hard seed is seed which does not take up water readily and may therefore not germinate until a considerable time after sowing. Samples of wild white clover tend to contain considerably more hard seed than commercial white Dutch; this seed is unlikely to germinate in the soil during the sowing season, April-August, but after being subjected to frost and thaw during the succeeding winter much or most of it will germinate in the following spring. It may then, however, be too late for the seedlings to be able to establish themselves in competition with the other plants which will have largely covered the ground. It is therefore evident that samples of wild white clover containing 20 per cent. and upwards of hard seed are not satisfactory even for including in long duration mixtures.*

The impurities met with in wild white clover and commercial white Dutch clover are decidedly different except when the wild seed is "once grown" under arable conditions, when the impurities are naturally much the same in both cases. The chief impurities met with in ordinary commercial white Dutch clover are very similar to those found in Alsike, the following being the most important:—Soft Cranesbill (*Geranium molle* and *G. pusillum*); Sheep's Sorrel (*Rumex Acetosella*), particularly abundant in samples from Central Europe; Madder (*Sherardia arcensis*); Yellow Suckling clover (*Trifolium minus*, Relh., *T. dubium*, Sibth.); and Trefoil (*Medicago lupulina*).

Dodder is a fairly frequent impurity in white clover from Central Europe, but is seldom or never met with in English or New Zealand samples. Wild white clover is likely to contain the seeds of plants normally associated with permanent pastures such as :—Yellow Suckling clover, Birdsfoot Trefoil, Crested Dogstail, Bent (*Agrostis*, spp.), Wood-rush (*Luzula*, spp.), and Sedges (*Carex*, spp.).

Yellow suckling clover sometimes contributes upwards of 50 per cent. to samples of wild white clover; this should always be guarded against when purchasing such an expensive seed as wild white clover.

Agricultural Uses.—Broadly speaking the ordinary commercial white Dutch clover should only be used in rotations, or as a component in mixtures for leys of not more than two or

* Hard seed detracts even more from the value of samples of red clover than of wild white clover, since the former is more generally used in rotations, so that if the seed does not germinate in the spring it will be of no value at all. Over 10 per cent. of hard seed is, however, the exception in red clover.

three years' duration, whilst wild white should in all cases be the white clover used for mixtures for leys of longer duration and for permanent seeding: indeed, it is often best to use the wild form even for two or three-year leys.

White Dutch clover is often sown in fairly large amount with perennial rye grass to afford sheep grazing for one or two years; about 5 to 8 lb. per acre of the commercial white Dutch seed is employed for the purpose.

It must be remembered that both commercial white Dutch and wild white clovers are valuable not only for the actual grazing they afford, but also because, with their rapidly spreading growth they tend from the outset to compete with weeds. Further, on account of the abundance of nitrogen-collecting nodules on their roots (especially in the case of wild white clover), they do much to enhance the fertility of the land. Red and Alsike clovers are valuable for the same reason, but since White clover lasts longer and spreads freely throughout the sward its influence on fertility is probably greater than that of the larger clovers.

It is therefore important from the point of view of keeping out weeds that White clover should be quickly established, and from the point of view of fertility that there should be an abundance of White clover in the sward when it is again ploughed. In the case of a one- or two-year ley the cheaper commercial white Dutch clover may often be relied upon to fulfil both functions, but it cannot be depended upon to persist in large amounts into a third year. For three-year leys it would be most satisfactory to sow about 2 lb. of wild white without any white Dutch clover. It is, however, not an uncommon practice to include about $\frac{1}{2}$ lb. per acre of wild white with 2 lb. of white Dutch in mixtures for such leys. There is, however, a considerable risk of the quicker growing white Dutch clover seriously interfering with the development of the wild white. Unfortunately the supply of wild white clover available remains inadequate and the cost of the seed continues to be excessive. This is to be the more regretted since there can be no doubt that it would be advantageous to employ the seed in short duration mixtures: it is a great mistake to regard wild white clover seed as being suitable only for permanent mixtures.

Long Duration Leys and Permanent Mixtures.—The inclusion of wild white clover in all mixtures for three years and upwards is strongly to be recommended; it ensures a good and lasting clover sward, and materially assists in keeping down

weeds. It is true that on certain soils and under the influence of phosphatic manures, the indigenous plant may re-establish itself abundantly by about the fourth year even without being sown and so ensure final fertility, but in this case it will not have achieved the earlier effect of suppressing weeds.

Numerous trials have now proved that it is seldom necessary to include large amounts of wild white clover in long-duration leys and permanent mixtures, but that all the benefits will usually result from including from $\frac{1}{4}$ to $\frac{1}{2}$ lb. per acre of this expensive seed in such mixtures—1 lb. probably in all cases being ample.

In this connection it should be remarked that seeds mixtures for long leys and permanent grass are often, if not usually, unduly complicated, so that by dropping a number of species of very doubtful value, 1 lb. or even more per acre of wild white clover might be employed without adding materially to the price per acre of the mixture as a whole.

If wild white clover at a high price is employed in seeds mixtures, it is very desirable to take precautions to ensure a good take, and to safeguard the development of the plants. Wild white clover may never establish itself if a corn crop is badly lodged on the "seeds," and even if the plants have established themselves they may subsequently be killed if a very heavy hay crop is allowed to develop in the first year. Wild white in a seeds mixture should therefore always be sown under a stiff strawed cereal or under rape, or without any nurse crop, and if hay is taken in the first year it should be cut early.

Growing Wild White Clover for Seed.—Information as to the growing of Wild White clover for seed will be found in Leaflet No. 355.

* * * * *

PREVALENCE OF DODDER IN GREAT BRITAIN.

THERE is no doubt that dodder, once it has become established, is one of the most harmful weed pests with which the farmer has to contend, and it is very important that it should not be allowed to gain a footing on clean farms. There are some eighty species of dodder known to science, several of which occur in this country. The species most frequently met with, however, is *Cuscuta Trifolii*, Bab., which chiefly attacks red clover and lucerne. It may be readily recognised by its red creeping stems smothering the host plant.

In most countries where laws are in operation for the purpose of checking the distribution of noxious weeds the sale of seed containing specified proportions of dodder is prohibited. Under the Seeds Act, 1920, it is necessary in this country for the presence of dodder to be declared if it is present in a parcel of seed to the extent of more than one dodder seed in 1 oz. of wild white clover; or in 2 oz. of alsike clover, white clover or timothy; or in 4 oz. of red clover, crimson clover, flax seed, linseed or lucerne. In some other countries the regulations governing the sale of dodder-infested seed are much more stringent. For instance the importation into France of any forage seed containing dodder is absolutely prohibited.

Prevalence in Different Districts.—The growth of dodder is affected by climatic conditions. It has, for example, rarely if ever been known to become established in Scotland and the presence of dodder in seed sown in Scotland is regarded as of no greater importance than the presence of relatively innocuous weeds. Farmers in Scotland can therefore utilise, without danger, clover seed, etc., which, owing to the presence of dodder, might be unsuitable for sowing in warmer climates. For this reason the Board of Agriculture for Scotland recently issued a general licence which renders it unnecessary for sellers of grasses, clovers, flax seed or linseed to make a statement in the terms of the Seeds (Scotland) Regulations, 1922, made under the Seeds Act, 1920, as to the presence of dodder, unless this information is specifically demanded by the buyer, and provided the purchaser resides or carries on business in Scotland and not in England, Wales or Ireland.

With a view of eliciting further information as to what extent dodder is in fact an established pest in England and Wales, an exhaustive inquiry was recently made by the Ministry of Agriculture, by ascertaining the opinions of the various County Agricultural Officers, numerous representative farmers, seedsmen, officials of agricultural colleges, etc.

From this inquiry it would appear that in Northumberland, Durham, Cumberland, Lancashire and Cheshire dodder is practically non-existent. It occurred in 1921 in the south of county Durham, but not to a harmful extent, and the fact that the dodder plants made good progress in this case was probably due to the exceptional season.

In the counties of York, Derby, Nottingham, Leicester, Lincoln and Rutland dodder is rarely seen, although a case is mentioned in Yorkshire where a crop of imported flax seed

was practically ruined by the parasite, and another in which a crop of single-cut cow-grass was seriously damaged by a 2 per cent. mixture of dodder added experimentally. In the latter case the winter frosts destroyed the dodder, but the clover plants were left in an enfeebled condition.

In another Yorkshire experiment, in which clover seed with a large percentage of dodder was sown in 1921, the effect was a rather serious check on the crop in the first year, but in the following year the clover crop had recovered and was good and healthy.

The pest seems to be more prevalent in the Southern and Eastern Counties. It is reported as serious in East Suffolk and fairly common in Northampton. In Kent it was a source of trouble on 3 or 4 farms during the past summer, but not prevalent in the county as a whole. In Essex the freedom from dodder is attributed to the sowing of superior seed. It is not a serious pest in East Sussex although several cases have occurred.

In the southern counties from Hampshire to Cornwall it does not now appear to be present to any harmful extent, although it was a serious pest a few years ago, when it was not unusual for entire crops to be lost owing to dodder infection. The same applies to Wales and to Staffordshire, Shropshire, Worcestershire, Warwickshire, Gloucestershire and Herefordshire, except that it seems to give some trouble in the south of the latter county and in Warwickshire.

Effect of the Regulations.—Judging from these reports it would appear that dodder is not a matter of much concern north of the Trent although it is necessary, even in the north of England, to be careful when sowing cheap foreign clover seed. Seedsmen are obviously alive to the desirability of excluding dodder, but it is suggested that the same care in cleaning imported clover seed would not be exercised if it were not for the fact that under the Seeds Act it is necessary to declare the presence of dodder. One correspondent states “the fact that so little dodder occurs in this country is more likely due to the fact that the declaration required under the Seeds Act has resulted in samples of seeds being usually free from the pest, than that dodder is not serious when it does occur.” Another correspondent in referring to the usefulness of the declaration as to dodder required under the Seeds Act says:—“I feel if it were removed it would be detrimental to the good class seed merchants who buy good pure samples on the market and

would make an opening for that class of man who is not a *bonâ fide* seed merchant, but who sells mixtures to farmers on the market which are inferior and impure and the origin of which he knows little or nothing about."

It is interesting to note that in the north farmers call Mountain Flax or Spurrey (*Spergula arvensis*, L.), which is prevalent on poor sandy soils, where it is sometimes cultivated either for sheep food or silage, "dother" or "dodder."

Amount of Dodder in different varieties of Seed.—The experience of the English Official Seed Testing Station during last season was that clover samples on the whole contained rather more dodder than in the two previous seasons. This is probably due to the favourable ripening conditions experienced in this country during the hot summer of 1921. This is suggested because the increase is greater in the case of English grown seed than in foreign seed.

Apart from the slight increase noted last season the general experience of the Station is that the dodder content of clover seed is decreasing.

The following table shows the percentage of samples examined at the Station which contained dodder:—

RED CLOVER.					
	All Samples	English	French	Czecho-Slovak	Italian
1921—22	21.8	10.2	18.2	57.1	83.6
1920—21	19.2	1.4	13.4	88.7	82.6
1919—20	18.9	3.4	15.4	75.5	81.1
1918—19	27.3	12.1	36.6	—	90.9
1917—18	26.8	24.0	19.0	—	82.0

MIXED ALSIKE AND LUCERNE.					
	ALSIKE.		WHITE CLOVER.		WHITE CLOVER.
	All Samples	Mid. European	All Samples	Mid. European	
1921—22	6.1	20.0	1.5	3.5	7.9
1920—21	5.5	38.9	3.4	12.5	16.1
1919—20	6.1	44.4	3.1	11.1	13.6
	Less than				Less than
1918—19	1.0	—	1.3	—	1.0
	Less than				
1917—18	1.0	—	1.0	—	7.0

In view of the shortage of the English clover seed crop last year, it will be necessary this season to use a larger proportion than usual of foreign grown clover. Farmers should therefore exercise great care when purchasing supplies and should examine the statement as to the quality of the seed, which the seller must provide in accordance with the terms of the Seeds Act, to ascertain that all dodder has been cleaned out or that the dodder content is low.

* * * * *

A TRIAL OF MOWING MACHINES.

II.

Mechanical Results.—Time and opportunity did not allow a complete investigation under this head. Nevertheless, the exacting conditions of the tests had the advantage of bringing to light certain minor weaknesses in the design and construction of the machines. It is probable that had the tests taken place on flat ground, very little difference would have been discernible in the quality of work done, and minor weaknesses would not have been revealed. An ideal tractor mowing attachment should embody the following features:—

- (a) Ability to cut efficiently up to a speed of 3 m.p.h.
- (b) The cutter-bar should be sufficiently flexible to follow minor irregularities of surface.
- (c) The lifting and tilting levers should be placed well within the reach of the tractor driver, and should not require great exertion to operate.
- (d) Ample facilities for lubrication should be provided, which will also require the minimum amount of attention.
- (e) Safety devices should be provided to stop automatically the forward movement of the tractor in the event of the cutter-bar meeting a serious obstruction.
- (f) The pitman wheel should be either placed in such a position that it cannot become choked with grass, or else be protected by a cover.

The tests made it possible to examine some of the main faults of mowing machines. It is realised that the efficiency of horse mowers has improved very appreciably during the last few years, as shown by the fact that a pair of horses can now draw an 8-ft. machine, whereas several years ago a 3-ft. machine was all that could be used. The following observations may be of service to farmers in obtaining the best results from their machines.

Heavy Draught.—Heavy draught is caused by (1) poor lubrication, (2) a dull set of knives, or (3) non-alignment. The remedies for (1) and (2) are obvious, but the importance of (3) is frequently not appreciated.

The cutter-bar should work at right angles to the machine when actually cutting. The resistance of the grass frequently causes the bar to drop back a little, and consequently some manufacturers advise setting the end of the cutter-bar forward a distance of about $1\frac{1}{2}$ in. With the cutter-bar working in this position the knife, connecting rod, and pitman wheel are in an approximately straight line. Should the outer end of the

cutter-bar drop back and alter the alignment, increased friction is caused on the inside shoe parts. This friction produces increased draught but does not cause side draught as is often supposed. Non-alignment does not often occur in machines of under three or four years' service, and this points to the fact that non-alignment is caused by wear in the hinged joints between the cutter-bar and frame. The majority of mowers are provided with methods of adjusting the alignment of the cutter-bar. When making this adjustment, it is extremely desirable that great care should be taken to ensure that the adjustment does not prevent the knife sections from registering with the fingers.

Uneven Cutting and Side Draught.—Uneven cutting and side draught are due principally to poorly adjusted cutter-bars. It must be appreciated that the principle of the cutter-bar is the same as that of a pair of shears. If the two blades are held closely together a clean cut results, whereas if the blades are held loosely the material to be cut will wedge between the blades and will finally be pulled and not cut. If at the end or beginning of the thrust by the connecting rod the knife sections do not centre with the fingers, only a portion of the grass wedged between the fingers is cut. The remaining grass which is not cut but is pulled offers resistance against one side of the centre fingers, and is consequently the cause of side draught.

It will be seen therefore that the causes of uneven cutting and of side draught are (1) the knife section not being firmly pressed against the ledger plates, and (2) the knife sections not centring with the fingers.

To correct (1) attention must be given to the guards, clips, and knife sections. If the guards are out of alignment the bent ones must either be straightened, or else replaced. Should the clips not be pressed firmly against the back of the knife, the clips should either be tapped down gently with a hammer or else replaced. Where both old and new knife blades are used, the clips should be adjusted for the new blades.

(2) One of the main reasons why on some machines accurate centring does not take place, is that the drag-bar is sometimes altered in order to bring the cutter-bar more forward. This alters the position of the whole cutter-bar in relation to the knife. The remedy is to adjust the drag-bar. A second reason for non-registering lies in the use of a pitman connecting rod which is either too long or too short. This latter trouble is not likely to arise upon machines having iron connecting rods.

It is interesting to note that the 7-ft. International tractor mowing attachment worked with as little side draught as a 4 ft. 6 in.-machine. This tends to show that side draught is not so much a matter of width of cut as of properly adjusted parts.

Broken Knives.—Non-alignment and incorrect adjustment of clips and wearing plates are fertile causes of wear in the cutter. The plates and clips will under these conditions eventually wear sufficiently to allow of play in the knife as it is thrust in and out by the pitman rod; the knife is then subject to continual shaking and repeated bending at the head. This undesirable condition is the immediate cause of the breakage of the knives of which non-alignment may be said to be the primary cause. The risk of broken knives is considerably increased by a badly worn pitman box or crank wheel. Excessive wear in the plates, clips and pitman components can readily be detected by the familiar rattle when the mower is at work and should serve as a warning that renewals or adjustment are necessary if breakages are to be avoided.

Clogging of Cutter-Bar.—A loose or broken knife section may cause the cutter-bar to clog at one point of its length. The action of grass juice and excessive oil on the bar is liable to result in the formation of a heavy gum sufficiently thick to obstruct the action of the knife.

Bench Test.—A bench test was arranged in order to determine for each machine:—

- (1) The efficiency of the knife components in cutting grass of measured gauge and moisture content.
- (2) The factors in the construction of the cutter and its mode of attachment that make for efficiency of cutting.

The test was made in the following manner. A tractor was suspended from four corners with its driving wheels clear of the ground. The attachment worked with its cutter above a platform along which trays containing grass of known texture, density, and moisture were passed at varying speeds. The knife was driven at different speeds in each experiment with the different gears provided on the attachment. In this manner all the field conditions with the exception of the uneven ground were reproduced.

The experiments were repeated with the various machines available. Lack of time, however, prevented their being carried to an entirely satisfactory conclusion, and it will be necessary

to resume the experiments at a later and more favourable opportunity in order to complete the data required. The particulars given in the accompanying table of mechanical details have been given purely as an example of the data so far collected and are not in themselves conclusive.

General Deductions.—Although circumstances prevented this test from being carried to a conclusion, there are certain general deductions which it is felt can safely be made at this stage. These conclusions are the result of visual observations on the occasion of the tests, but it may be confidently anticipated that they will find ample support from the data furnished by later and more detailed experiments.

There is little difference in the various cutters and their components. As regards the attachments as a whole, the principal difference noted was in the gear ratios used; from the table it will be seen that the pitman revolutions per minute at $2\frac{1}{2}$ miles per hour, varied between 470 for the Cutmore to 770 for the Bentall.

Among the factors that require to be determined are the varying resistances offered by grasses of different types and varying moisture content, together with the most efficient cutting speed of the knife. As regards the resistances offered by different grasses, the data at present to hand do not justify any general conclusion, but there undoubtedly is a best knife speed for each texture of hay-grass. Variations of 10 revolutions per minute from this speed have no observable influence on the quality of cutting, and a marginal variation of possibly 50 revolutions per minute may be allowed within which cutting is still moderately good.

The scope of this investigation is not confined to knife speeds, travelling speeds and the nature of the material cut. The constructional details of the fingers, clips and blades require careful consideration. It was found, for example, that when the arches of the clips had only a small clearance heavy moisture in the crop was liable so seriously to resist the motion of the knife as to cause excessive strain on the pitman wheel. The most advantageous clearance may readily be calculated for a machine which is observed to work efficiently in a moist crop. This will serve as an illustration of one of the factors that may be determined by this investigation when it is completed.

* In this *Journal* for March, 1923, p. 1093, it should have been stated that the Taco-Myers Tractor Mowing attachment is manufactured by the Tractor Appliance Company, New Holstein, Wisconsin, U.S.A. The British representative is Mr. E. H. Thompson, 58, Middlesborough Road, Coventry. The average price of this mowing attachment in 1922 was £35.

TABLE I.
COMPARATIVE PERFORMANCES AND COSTS.

*Soil—Very heavy loam.
Crop—Generally poor.*

Device	Power	No. of Men	Total Working Time	Total Average Cut	Average speed of cutting in m. p. hr.	Average Area Cut per Hour	Costs			Total	Cost per Hour		Cost per Acre
							Labour	Capital* Charges	Fuel		£	d.	
Albion	2 horses	1	8 37	6.4	1.2	0.75	£ 5 5	£ 16 2	£ —	£ 21 7	£ 2 6	£ 4	£ 3 4
Bentall (experimental) ...	Fortison Tractor...	2	4 18	4.7	2.0	1.09	£ 5 5	£ 3 4	£ 6 0	£ 14 9	£ 3 5	£ 3 2	£ 3 2
Bentall (two machines) ...	Fortison Tractor...	3	5 17	13.1	2.4	2.18	£ 9 11	£ 6 3	£ 9 3	£ 25 5	£ 1 10	£ 1 11	£ 1 11
<i>Tractor attachments</i>													
Cutmore	Fortison Tractor...	1	15 3	23.7	2.2	1.58	£ 9 5	£ 12 7	£ 23 7	£ 45 7	£ 8 0	£ 1 11	£ 1 11
International	International Junior Tractor	1	6 8	7.3	1.4	1.21	£ 3 9	£ 5 5	£ 9 8	£ 18 8	£ 3 1	£ 2 7	£ 2 7
Otwell	Fortison Tractor...	1	8 36	12.9	2.1	1.51	£ 5 5	£ 6 9	£ 11 1	£ 23 3	£ 2 8	£ 1 10	£ 1 10
Taco-Myers	Fortison Tractor ...	1	11 15	17.0	2.1	1.51	£ 7 0	£ 10 11	£ 25 2	£ 43 1	£ 3 10	£ 2 6	£ 2 6

* The capital charges include depreciation, repairs, and interest on capital. In the case of tractors the same figures have been taken for the two types used, as their respective working lives are not known.

TABLE II.
MECHANICAL DETAILS

Device	Travelling Speed in miles p. h.*	Pitman Wheel R.P.M.*	Average per cent.			Pitman R.P.M.			Forward movement of Tractor in inches to each revolution of the Pitman wheel
			Traction load in lb.†	Increase in loads		2 m.p.h.	2½ m.p.h.	3 m.p.h.	
				Gearing	Cutting				
Albion	1.47	500	—	—	—	600	750	900	3.5
Bentall (experimental)	1.38	420	536	10.6	11.6	610	760	910	3.5
Bentall	1.21	374	538	7.4	8.7	620	770	930	3.3
Bentall (two machines)	—	—	573	19.0	27.9	—	—	—	—
Curmore†	1.0	187	800	5.0	9.1	380	470	560	5.6
International	1.0	260	1,042	5.9	11.3	520	650	780	4.1
Otwell	.85	225	802	11.6	20.2	530	660	800	3.3
Taco-Myers	1.06	300	850	6.5	9.0	570	710	850	3.2

* Bench Test.

† The traction loads in the case of tractor mowing attachments includes the draught of the tractors.

‡ Two sprockets are supplied with this machine, one with 14 driven teeth and the other with 10 driven teeth. The larger one giving the slower knife speed was used for this test. The use of the smaller sprocket would have increased the knife speed by 40 per cent.

VIOLET FELT ROT RHIZOCTONIA) OF CLOVER.

W. M. WARE, B.Sc. (Agric.),
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In mid-November of 1922 a field of red clover which was attacked by *Sclerotinia trifoliorum* causing stem-rot (clover sickness), was kept under close observation with the object of discovering whether any of the occasional plants of wild white clover amongst the red clover had suffered from the disease.

In the course of these observations, certain patches of the red clover were noticeable owing to their presenting an unhealthy appearance quite different from that characteristic of clover stem-rot (*Sclerotinia trifoliorum*). Examination of affected plants showed that they were attacked by a fungus, *Rhizoctonia violacea*. This fungus has already been described as attacking red clover on the Continent,* but so far as the writer knows, it has never been recorded as occurring on clover in this country. It is well known as causing serious injury to many other plants of economic importance and its attacks have been described by various authors from time to time on the following amongst other plants:—seakale,† carrots,‡ potatoes,§ saffron, lucerne, beet, asparagus, shallots, and madder. It has yet to be proved whether the fungus can pass readily from other host-species to clover, or whether specialized races or forms of the fungus exist.

Occurrence of the Disease.—The early winter of 1922 was mild with only occasional frosts. The disease was first observed at the end of November, 1922, but judging from the condition of the affected plants, it seems probable that the first appearance of the disease must have been some weeks earlier. Whether primary infection was aided by the mild conditions is unknown; it is possible that the frosts were responsible for the awakening or stirring into active growth of the dormant resting-bodies (*sclerotia*) of the fungus, which may have been in the soil.

* Eriksson J., *Fungoid Diseases of Agricultural Plants*, 1912.

† Salmon, E. S., and Crompton, T. E. *Report on Economic Mycology*, South-Eastern Agric. College, Wye, 1908.

‡ Van der Lek, H. A. A., *Contribution à l'Étude du Rhizoctonia violacea*. *Extrait abrégé des Mededeelingen van de Rijks Hoogere Land, Tuin, en Boschbouwschool*, XII, 1917.

§ Ministry of Agriculture and Fisheries. *Collected Leaflets*. Sectional Volume No. 3, 1921.

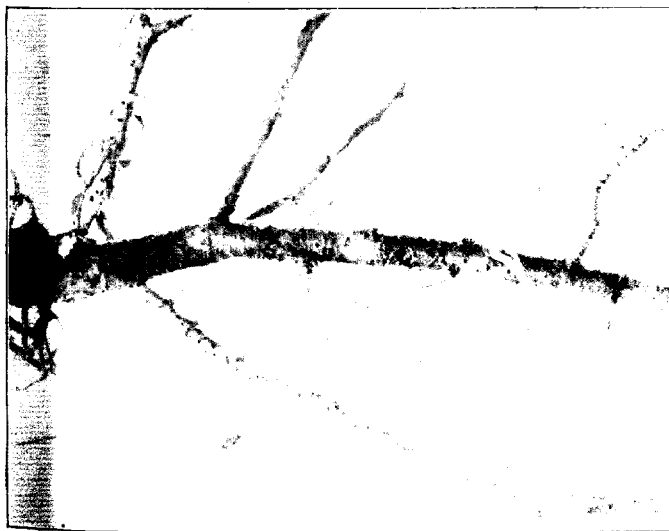


FIG. 1.—Part of a root of Red Clover showing numerous "sclerotia" of *Rhizoglyphis*. (About twice natural size.)

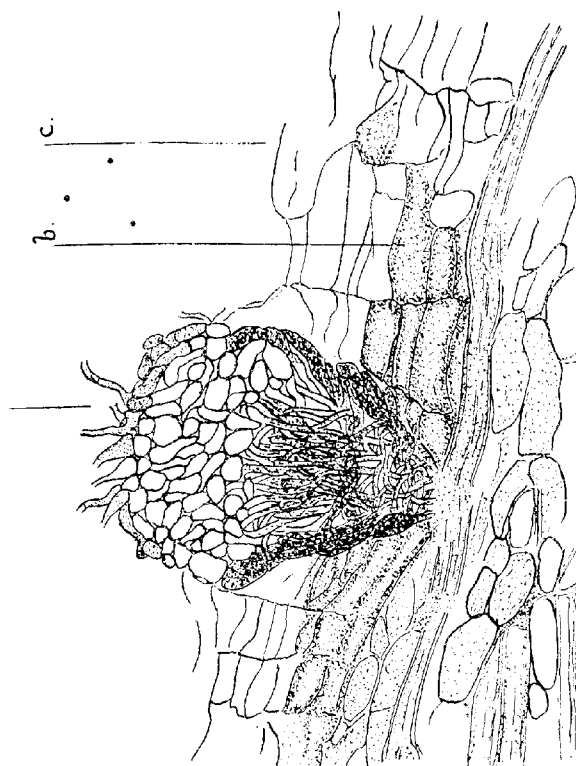


FIG. 2.—Part of a transverse section of a root similar to that shown in FIG. 1. A Sclerotium (a) consisting of fungus threads which have penetrated the dark cells of the root (b), (c) and have killed these shown at (b). (Greatly magnified.)

The fact that the fungus was found in an active state upon weeds and upon the stubble in the "seeds" causes a further complication in determining the means of original infection of the clover.

Although clover sickness was present in the same field, its attack was limited to certain areas and even to individual plants, and though occasionally the two diseases were found together in the same area, there were quite distinct patches suffering from the *Rhizoctonia* disease alone. It is thus quite evident that *Rhizoctonia* was present as a parasite on the clover, and was not merely saprophytic on plants or parts of plants previously killed by clover sickness. This was borne out by a close examination of diseased plants in various stages of attack.

Description of the Disease.—The vegetative part of the fungus has a compact, felt-like nature, and is found closely covering the substance upon which it is growing. It has a distinctly violet colour.

The presence of *Rhizoctonia* was first recognised on the brown, dead stubble of the previous oat crop in which the red clover had been sown. The violet-brown spawn covered the straw from soil level to a height of two and a half inches, and being fringed with white at its growing extremity, was particularly conspicuous. Close to such infected stubble, the clover plants were dwarfed and stunted, their outermost, larger leaves were either yellow, wilted, or dead, and the young shoots in the centre of the crown were stunted and somewhat limp. The appearance resembled that of clover attacked by eelworm, *Tylenchus dipsaci*, except that there was no swelling or malformation of the leaf stalks and shoots—a characteristic feature of eelworm attack.* Unhealthy coloration was evident, more especially in the young shoots in the centre of the crown, where stipules and leaf stalks were very commonly bright red. The leaf blades were pale green or yellowish. Many, though not all, of the plants affected, showed on closer examination, purple-brown mycelium, fringed with white, covering some of the lowermost stipules and shoots: this can be seen in Fig. 5.

Plants of red clover, dug up and carefully washed, revealed the violet-brown mycelium, in many cases, just above and below soil level. Oat stubble, similarly examined, showed the mycelium covering the straw below soil level and fragments of it were found penetrating the earth and covering solid objects such as stones and pieces of stick.

* Described and illustrated by Arthur Amos, Jour. Royal Agric. Society of England, Vol. 79, 1918.

The attack is apparently carried out by the fungus with great vigour, and the entire root system of the clover plant is first destroyed in the following manner. The fungus threads penetrating the soil attack the main root and its branches and cover them with minute, twisted, brown strands. At numerous points the fungus penetrates the outer cork layers of the root, reaching as far as the cortex and at each place forming minute resting-bodies which possibly have also the function of suckers. These resting-bodies (*sclerotia*) can just be seen with the naked eye as small black dots, and are shown magnified in Fig 1.*

The layers of the root immediately in contact with these *sclerotia* become yellow or brown and are apparently killed; they are shown at B in Fig. 2. The fungus gathers strength and proceeds to envelop the root further until finally the whole root system becomes dark-coloured, soft, and rotten; it is at this stage that the above-ground parts of the clover present their most unhealthy appearance. In a few instances the whole of the above-ground parts were found enveloped in mycelium and killed: in many cases, however, the above-ground parts were not attacked, but the main root system was dark-coloured and studded with *sclerotia* (Fig. 1). In the majority of cases the plant (whether its stems are attacked or not) makes an effort to replace the loss of its main root system, and before this has completely rotted away, by adventitious roots developed from the base of the "crown." If these are forthcoming in time, the plant may be saved, and the effect of this renewal of the root system is immediately seen in the above-ground parts. Fig. 3 shows the useless main root system, dark-coloured, and now replaced by adventitious roots from the "crown."

The most critical period is when the main tap root has become rotten and the adventitious roots are just being formed: at this stage, plants can actually be picked up from the soil without any pulling effort since they are only provided with adventitious roots barely half-an-inch long.

Fig. 4 shows a healthy plant and one the root system of which is destroyed. This new adventitious root system becomes very strong and dense, and takes the place of the thick, woody tap root and its branches, as shown in Figs. 5 and 6.

The new root system was not found attacked by the fungus. It follows from the above that the plants killed are not

* The author wishes to express his thanks to Dr. H. Wormald for the photograph reproduced in this figure.



FIG. 1.—Top, showing young healthy plant of Red Clover. Bottom, showing roots of plant totally destroyed by *Rhizoctonia*.



FIG. 3.—Red Clover plant showing Tap Root T.R., rotten and nearly useless, having been replaced by adventitious roots A.R. from the crown.



FIG. 5. Red Clover plants showing two stages in the replacement of the root system (red 15 days).

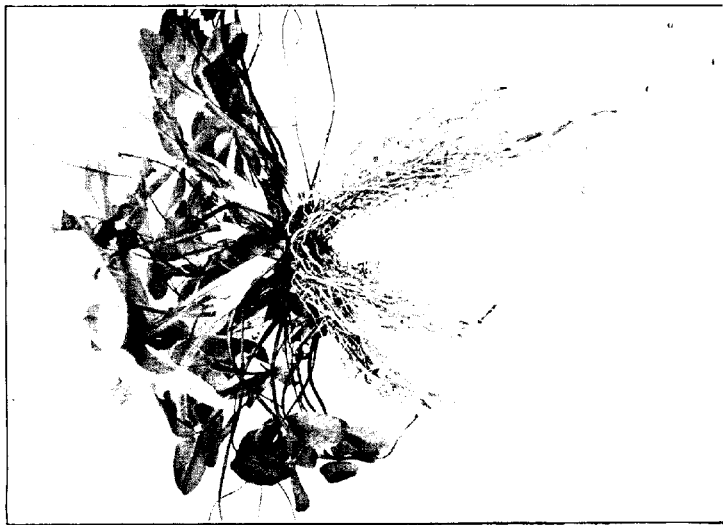


FIG. 6. Red Clover plant having a new root system, showing the old root system and the new root system (red 15 days).

necessarily numerous. The mild, moist weather of this winter although favourable to the fungus, has probably helped the plant during its most critical period: sudden frosts, on the other hand, would probably hinder the recovery of those plants which happened at the time to be practically without roots. The worst effect hitherto noticed, beside the killing of a certain number of plants, is that patches of the clover are retarded, dwarfed, weakened and somewhat thinned.

Amongst the red clover the *Rhizoctonia* was found attacking living plants of Corn Mint (*Mentha arvensis*) a common weed of the district. The upright annual stems had been cut to the same level as the stubble and the violet-brown mycelium enveloped them at ground level, though not lower; some of the lowest lateral shoots were completely encased by the felt-like growth. Small plants of Meadow Grass (*Poa*, spp.) and of Speedwell (*Veronica agrestis*) and a dead plant of Knotgrass (*Polygonum aviculare*) were found thickly coated with the spawn of the fungus, but in none of these cases were sclerotia found.*

The presence of the fungus on both living and inert material indicates that moisture is of considerable importance to enable it to spread; patches of the violet "felt" up to one and a half inches square were frequently found on the smooth surface of flints.

Continuance of the Disease.—The *Rhizoctonia* is able to survive after the decay of the clover roots has taken place. The minute sclerotia are set free in the soil and it is probable that they remain in a dormant condition for some years, many of them starting into active growth each season.† The next serious outbreak will only occur when a crop, suited to the fungus, is again taken on the same field in the ordinary course of the rotation. It is probable also, that since it is capable of attacking weeds, the fungus will exist from season to season on indigenous plants.

Measures of Control.—No experiments in the control of the disease on clover have yet been made. Having regard to the nature of the disease, it is clear that, as in the case of clover sickness, the best preventive measures will be found in giving the affected soil as long a rest from clover as possible. More

* Numerous self-sown oats were germinating at this time amongst the clover, but the only part of these that was seen infested was the husk of the seed oat; neither the shoot nor the seed roots being attacked.

† No spores or fructifications were found by the writer in either the violet or white parts of the mycelium.

than eight years' interval between two clover crops is advisable.* In adopting the above measures, it must, however, be borne in mind that this form of *Rhizoctonia* may live unnoticed upon some other crop, or on weeds, in the meantime.

Owing to the importance of red clover on the farm, it has been thought advisable to describe this new disease as soon as possible, in order that farmers may become acquainted with the fact of its existence, and to suggest that they would be well advised to obtain expert opinion in cases where clover shows signs of failure.

* * * * *

REPLENISHING STOCK IN BACK-YARD POULTRY KEEPING.

LIEUT.-COLONEL F. W. HARDY.

THE progressive poultry keeper must always be looking ahead, and preparing for the following winter's egg supply. It must be remembered that the yield of eggs during the autumn and early winter, when prices rule high, comes very largely from the pullets, and these must be hatched, in the case of the lighter breeds, not later than April or early in May, to produce eggs in October and November. The writer is of opinion, after trying several breeds, that for egg-production on the intensive system the light varieties are by far the most profitable. They are so much more active than the heavy breeds, that they do not tend to put on fat in their second year like the latter, and are in consequence well worth keeping through the moult, as they are likely to give a good account of themselves during a second season.

Under such conditions, and making due allowance for possible losses and the weeding out of indifferent layers, one must estimate to replace from rather over one-half to two-thirds of the laying stock each year. There are several ways of doing this, depending much upon circumstances.

1. When Little Space is available.—Where the poultry keeper has little or no room available, except for housing his adult birds, or where he is absent all day, and no member of his family is available to look after the chicks, it is much the wiser plan to give up the idea of chicken-rearing altogether, and to buy five months' old pullets at the end of August or early in

* The previous leguminous crop taken in the field under observation, was white clover and trefoil on one half, and sainfoin on the other, in 1915.

September. They should be purchased from a reliable breeder, *not a dealer*, and should be from stock reared on free range, or nearly so.

Extravagant prices should not be paid, because the birds will not be required for breeding purposes, but neither should the poultry keeper go to the opposite extreme, and expect to get good pullets at the price of second-scason hens. Usually, the County Councils have lists of Station Holders from whom reliable stock may be obtained on reasonable terms. In any event orders should be given early in the season, to avoid disappointment.

2. When Space is not so limited.—Where space is not so limited, especially if the poultry keeper has a lawn available for the first two months, it is quite feasible to raise chicks successfully, provided the necessary attention can be given to them. On the whole, it is better not to use one's own eggs, and so avoid the necessity of keeping one or more cockerels. Before these are ready for the breeding pen, they have cost a good deal for food, besides being a nuisance to one's neighbours. The resulting progeny, moreover, is not likely to be so vigorous as that from fowls enjoying more freedom, whilst the egg supply from a breeding pen will not be so abundant as where the hens are fed on a more stimulating mash than is advisable for stock-raising purposes. This loss of eating eggs will go far to neutralize the reduced cost of one's own sittings. On every ground, therefore, it is better to purchase eggs for hatching.

The following courses are open: (a) Sittings may be bought and hatched under hens, or in an incubator. The writer recommends the former method, as he regards the use of a single small incubator—and the back-yard poultry keeper would hardly require more—as uneconomic. The air temperature in an incubating room should not fall below 50° F. if possible. In the month of March this is only likely to be the case if one selects a warm room in the house, and even then a fire or oil stove may sometimes be needed. Where several machines are in use, the lamps of these are sufficient to render the use of a stove unnecessary. There is, however, another point, often forgotten. If an incubator be used in the house, it is necessary to inform the Insurance Company, who will probably demand an increased premium. If hens are not available, it is often possible to get the eggs hatched for a consideration,

the usual charge being 3d. per egg, or in some cases per chick. It is better to do this than to wait for broody hens and lose valuable time. Broodies should be carefully inspected to see that they are free from scaly leg, and as far as possible from lice. They should be well dusted with a good insect powder two or three times during the period of sitting.

(b) The alternative to hatching is the purchase of day-old chicks. The success of this method depends on circumstances. Careful packing in suitable boxes is most important. Many chicks die or make a bad start from neglect of these precautions. Where possible it is best to fetch the chicks oneself, and bring them straight home. When this is not practicable, the purchaser should make arrangements to be informed by telegram of the train by which the chicks will travel, and their age in hours. They can then be taken straight from the train and cared for properly. The chicks should not be fed for the first 48 hours after hatching, all they require during that period being warmth, rest, and quiet.

Rearing.—The rearing of chicks on a strictly limited area, requires great attention to detail. Where hens are in use, a two-compartment coop, such as that shown in Fig. 1, is a great advantage; indeed, early in the season or during spells of wet weather, it is almost essential. The right hand compartment contains the hen. She is taken out twice a day to be well fed and watered, also to give her an opportunity of dusting herself. The partition has a sliding door secured by a wedge, so that the chicks can run in and out. Access to both compartments is obtained by linging the middle third of the roof. The floors are raised 1 in. above the ground level, and are removable; they are covered with fine peat moss or chopped straw. The chicks are always fed in the left hand compartment. The coop illustrated, which is 4 ft. 6 in. long, 2 ft. deep, and 1 ft. 10 in. high, has the sides, back and centre division made out of pieces of asbestos cement sheeting. This material answers very well for the walls, as it does not harbour insects. It is too cold for the roof, which is of wood covered with bituminous felt. Four handles render it very portable, so that it is easily moved to fresh ground. Lastly, there is a wooden framework—not shown in the illustration—of 2 in. by 1 in. battens, measuring 6 ft. by 4 ft. 6 in. by 1 ft. 6 in. and covered with 1 in. mesh wire-netting, which fits in front of the coop, and enables the chicks to run out on the grass, safe from cats or other marauders.

There is nothing so good as a well-mown lawn for rearing purposes. By constantly moving the coop, and brushing over the grass with a besom, the rearing ground can be kept quite sweet, whilst the chicks will benefit greatly from the young grass and clover.

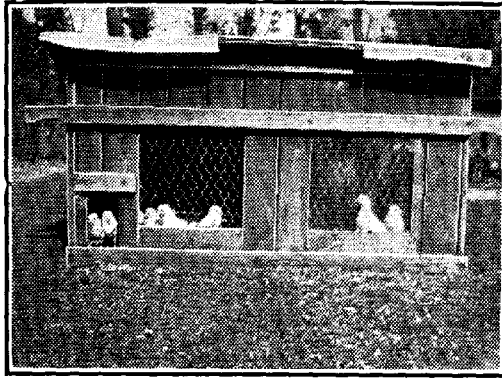


FIG. 1.—Two-compartment Coop for rearing chicks.

Methods of Brooding without Hens.—There are three ways of doing this:—(1) The hover; (2) The fireless brooder; and (3) The lamp brooder.

The Hover.—A good hover makes artificial rearing a very easy matter. There is little danger of overheating, as the chicks are not boxed in, whilst the air is always fresh and no fumes from the lamp should be able to reach them. A hover must, however, be located in a house—a 6 ft. by 4 ft. by 4 ft. type will do quite well. Some chaff litter should be placed on the floor, and where there is any danger from rats adequate protection should be given.

The Fireless Brooder.—It is not everyone who is successful with this method. Something depends on the weather, and a good deal more on the patience and aptitude of the attendant. The writer's one and only experience was in March, 1922. The weather could only be described as vile. Frost nearly every night, cold east winds, and an entire absence of sun, proved a very adverse combination. In spite of every effort, the result was a failure. On the other hand there are many people, chiefly women, who make a great success of it. Rather, however, than court a second disaster, the appliance was quickly converted into a lamp brooder.

The Lamp Brooder (see Fig. 2).—This appliance can be easily made by anyone having a fair knowledge of carpentry. The size here described took three dozen chicks comfortably, and cost 25s. all told. The heat was supplied by a hurricane lamp. At the end of five weeks, when the lamp was withdrawn, 33 fine healthy chicks remained. The secret of success with this type of brooder is correct ventilation. There must be a double bottom with a space of one inch between the floors. Air enters this space by a series of small holes bored through one side. A circular hole 7 in. in diameter is made in the centre of the upper floor. A strip of zinc sheeting 3 in. wide and 23 in. long, fits into the well so formed. The ends will overlap one inch, and they need not be soldered. Before inserting this collar, two rows of holes are punched in it, $\frac{1}{2}$ in. and $1\frac{1}{2}$ in. from the bottom edge. The former admit air to the well, the latter are made to receive a

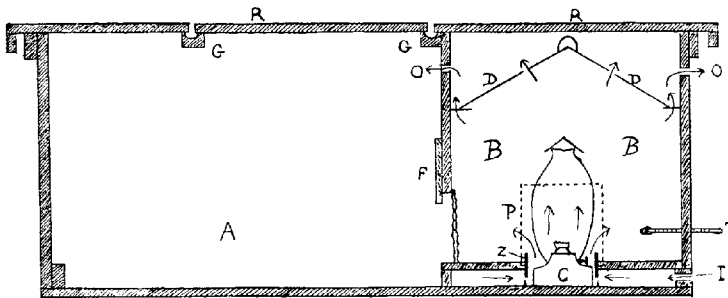


FIG. 2.—Vertical Section of Lamp Brooder. Length 6 ft.; breadth 2 ft. $1\frac{1}{2}$ in.; height 1 ft. 11 in. front, 1 ft. 7 in. back. (R) Roof in sections, hinged behind, and covered with bituminous felt. (A) Outer chamber, (B) inner chamber, (C) hurricane lamp, (D) cone of iron sheeting, (I) fresh air inlets, (F) sliding trap door, (G) back to front roof supports with groove to carry off water, (O) foul air outlets, (P) perforated zinc collar, (Z) zinc collar.

number of nails which fix the collar to the floor. After securing this, any small spaces are filled with putty, as the floor must be quite draught proof. A second collar fitting immediately outside the first and 8 in. deep, is made of perforated zinc. The edges can be secured with thin wire or copper rivets. The object of this is to prevent the chicks getting too close to the lamp. A shallow circular cone made out of sheet iron covers the lamp and takes its support from four screw eyes inserted in the walls. Two and a half inches from the top of the latter are five holes $\frac{3}{8}$ in. in diameter in each wall of the brooding chamber. The four corners of this are blocked out by strips of wood 8 in. high placed at an angle of 45° . This is to prevent crowding, with the risk of casualties. A door 5 in. wide and 5 in. high

leads into the outer (exercising and feeding) chamber and is protected inside by a double felt curtain, slit on the hit and miss principle, while a sliding trapdoor on the outside can be let down at night if the temperature be too low. The roof of each compartment is separately hinged, affording access to the interior and an additional means of ventilation, while a window, preferably double, is let into the lower portion of the front for inspection purposes. If the brooder be on the ground, a small portable looking glass, held at an angle, enables one to see what is going on, but for the first week it is a convenience to place it on trestles. When the heat is just right the chicks are evenly distributed, if too cold they crowd around the lamp, and when too hot they get away from it as far as possible. It is, however, desirable to insert a brooder thermometer through one of the walls, the bulb being about two inches above the floor. Fig. 2 will explain the above description.

The principle of the ventilation of the inner chamber, on which the success of the brooder depends, is as follows: Fresh air enters between the floors and *not* across the backs of the chicks. This air supplies the lamp, which heats the air of the chamber by contact with the glass chimney, by radiation from the flame, and by warming the iron cone, which throws its heat on to the chicks' backs, that part of their body where it is most wanted. The lamp brooder has one advantage over the hover—it can be located in the open.

The outer chamber has an open front, boarded up for 4 in. and covered with 1 in. mesh wire netting. It can be protected in windy weather by a sheet of glass extending to within 3 in. of the top of the wire. Both floors are covered with peat moss or chaff. A small trapdoor, hinged below, gives access for the chicks to the outside.

Feeding.—Correct feeding is of course most important. The following system is in force on one of the best and most successful poultry farms in this country:—

1st 48 hours.—No food.

3rd to 5th day inclusive.—A little pinhead oatmeal fed four times a day. The chicks are still absorbing yolk. Too much food at this period is disastrous.

6th to 14th day.—A good biscuit meal is scalded with boiling water and left to soak for half-an-hour. It is then dried off with Sussex ground oats and fed twice a day. In addition the following dry feed is supplied in the scratching litter:—

15 lb. flaked maize (medium fine).

15 lb. cracked wheat.

15 lb. pinhead oatmeal.

5 lb. cracked hemp seed.

2½ lb. cracked canary seed.

Hemp seed is one of the most valuable food stuffs we have. The protein is of excellent quality, whilst there is a fair amount of oil present, which aids the chick in maintaining its body heat. It also promotes feathering. As, however, the outer covering of hemp and canary seed is hard and impervious, it is *essential* that they be first cracked, otherwise they cause indigestion.

14th day to end of 1st month.—The above dry chick feed is continued and the following dry mash given :—

Middlings 4 parts.

Sussex ground oats 2 parts.

Maize meal 2 parts.

Dried separated milk 1½ } or fish meal impregnated
Dried yeast ½ } with cod liver oil.

These last items may be alternated. One part of the above mash should be well mixed with 3 parts of broad bran and placed in hoppers always open.

Cod liver oil is very beneficial to growing stock. An alternative method of feeding it is to rub it up with the bran in the proportion of one teaspoonful of veterinary cod liver oil to each pound of *mash*. When all lumps have been broken down and the oil is evenly distributed, the bran can be mixed with the mash in the amount already noted, and the fish meal may be omitted.

The amount of bran should be reduced to two parts during the second month and one part during the third month.

The above rations are for chicks on free range. When kept intensively a liberal amount of fresh green stuff must be given daily. Finely chopped dandelion and chickweed are two of the best forms of vegetable foods for chicks, and fortunately both are usually plentiful in spring. Fresh lettuce is also excellent, and where watercress can be obtained cheaply, there is nothing better.

It should go without saying that an abundance of fresh clean water should always be before the chicks, in vessels that are not easily polluted. It is of equal importance that from the first, a little coarse sand should be always before the chicks. This is much to be preferred to the fine sharp flint grit usually recommended.

Fig. 1 appeared in "*Eggs*," on 7th June, 1922, and the writer's thanks are due to the Editor of that publication for the loan of the block.

* * * * *

• THE COLORADO BEETLE.

THIS beetle (*Leptinotarsa decemlineata*, Say.)—notorious as a potato pest—was first discovered in the west of the United States where it was living upon a wild plant related to the potato. About the year 1850 it was first noted on potatoes and by 1874 it had spread eastwards across the continent of America to the Atlantic and also northward into Canada. On several occasions it has been carried by shipping to Europe and has even established small colonies which up to the present have been stamped out by the use of drastic measures—as, for instance, at Tilbury in 1901-1902. In 1922 the beetle was discovered in France in the neighbourhood of Bordeaux, about 100 square miles being infested. This is the most serious outbreak which has yet occurred in Europe and it renders great vigilance advisable on the part of potato growers in order to prevent a similar occurrence in Britain.

Description and Life-History.—The adult beetles (Fig. 1) are about half-an-inch in length, yellow in colour with five longitudinal black lines on each wing-case—ten lines in all. The winter is spent under the soil, usually about ten inches below the surface, but less frequently the beetles winter among rubbish. When the weather becomes warm in spring or early summer they come out, pair, and the females fly in search of potato plants, tomatoes or such related weeds as deadly nightshade, upon which to feed and lay their eggs. As the beetles may become active before the majority of the potato crops are above ground, the insects may be forced to fly considerable distances to find their food. On reaching potato plants they feed on the foliage (Fig. 2. A.) and also lay eggs—yellow and oval in shape—on the undersides of the leaves (Fig. 2. B.). The eggs are laid in clusters of from ten to forty and in a week or longer, according to the weather, hatch into red-brown larvæ or grubs (with six legs but no wings) which eat the potato leaves and grow rapidly, becoming paler in colour, varying from orange to brick-red, and noticeably spotted with black (Fig. 2. C.) The grubs feed for three weeks, probably longer if the weather is cold, and, if numerous, strip the plants of their foliage and even eat the haulm to the ground; they then bury themselves in the soil, where they change to pupæ and subsequently to adult beetles. In accordance with the climate there may be one, two or even three generations in the summer. On

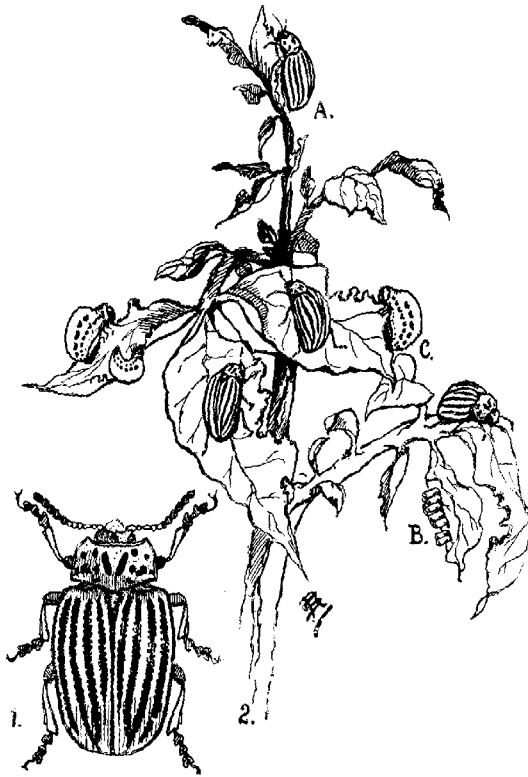
the approach of cold weather in the autumn the beetles bury themselves in the soil to await the following spring.

The Risk to Britain.—Taking into account the records of the behaviour of the Colorado Beetle in the outbreaks which have already occurred in Europe, it seems only too likely that the insect would find the climate of England congenial and that it would in consequence cause great loss, the nature of which is evident, since a potato plant devoid of foliage or eaten to the ground cannot produce a crop.

As regards the means by which the insects may be expected to reach our shores, it is fairly certain that they cannot fly from Bordeaux, still less from America, and they must therefore come on board ship. In this connection it is obviously the adult beetles which are to be feared, since they can fly on to vessels or crawl into packages awaiting shipment, and on arrival at an English port they can again fly, if necessary for several miles, until they meet with food. Spring or early summer is the most dangerous period, for the beetle is then most likely to wander and a single female will be sufficient to start an outbreak. On the other hand, beetles arriving in England in autumn are infertile, must wait until the spring, and then the two sexes must meet before breeding can take place, a coincidence which is evidently unlikely to occur. Still more remote are risks from the introduction of larvæ, since for all practical purposes they may be regarded as incapable of travelling for more than a few yards and must therefore be actually placed among growing potato crops if they are to live. The same applies with equal force to eggs. The practical application of this is that no matter what regulations are made to guard against the importation of the Colorado Beetle, some risk must still remain, since no precautions can prevent a beetle from flying on to a ship in America or France and flying off again when the vessel reaches an English port. With the establishment of a colony of the pest so near as Bordeaux this risk is very definite and, unless the French are successful in their attempts at eradication, it is by no means unlikely that England will have to deal with an outbreak before many years are past.

Prevention and Control.—Such legislative measures as are possible have been, and will be taken to reduce the chances of the importation of Colorado Beetles and, as these measures must vary from time to time, the Ministry will issue special notifications. If an outbreak is discovered drastic measures will

again be necessary in attempting to extirpate the pest and will probably be successful provided they are taken in time. It will, however, be exceedingly difficult to stamp out a colony after it has been present for a year or more and, if this should occur, the insect will probably have to be numbered among our regular



The Colorado Beetle.

FIG. 1.—Beetle. FIG. 2.—Damaged potato foliage, showing :—
(a) beetle, (b) eggs, (c) larva.

potato pests. Growers will then find that they can only obtain a crop if they spray it twice during the summer with lead arsenate or other poisonous wash, and they can in consequence estimate the loss annually as the cost of two spray applications—a severe addition to the expenses of a crop in any case costly to grow.

It cannot therefore be urged too strongly that growers, in their own interest as well as in that of the country, should keep a careful watch for any suspicious pests on their potato crops, and notably for yellow and black insects feeding upon the foliage. By notifying the Ministry at once they may be the means of preventing the establishment in England of perhaps the most serious insect enemy of the potato known up to the present.

Legislation.—The Colorado Beetle was made the subject of legislation in 1877 by the Destructive Insects Act, and it is included among the insects scheduled under the Destructive Insects and Pests Order of 1922. This Order renders it illegal to land, sell or offer for sale in England and Wales any living specimen of the beetle, without the written permission of the Ministry. Owing to the appearance of the pest in 1922, in the neighbourhood of Bordeaux, the importation of living plants or vegetables into this country from a certain area in southern France is prohibited by the Colorado Beetle Order of 1922. Copies of the above mentioned Orders may be obtained on application to the Ministry.

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BLACK CURRANT GROWING IN NORFOLK.

H. GOUDE, N.D.H.,

Horticultural Superintendent for Norfolk.

EAST NORFOLK has become the most important centre for Black Currant production in England. The reason for this development is due to exceptional local conditions favouring the growth of the crop, and the skilful use of these facilities by the cultivators. These men were the first to recognise "reversion" as a serious trouble, but called it "nettle-leaf"—a most appropriate definition of this condition. Here we have large areas of light loam soils of great depth and good natural drainage, but still moisture holding. The favoured spots come under the influence of the sea and broads, and even in sultry weather the air in this neighbourhood has a freshness in it that is well known and appreciated by the numerous visitors who come to the district each season.

Varieties and Strains.—The choice of varieties is an important item, but the actual strain of the particular variety is of greater consequence. We find, for example, that the cropping

power of individual bushes of any sort is greater than that of their neighbours. It is now customary to build up stocks from these selected specimens, and many of our cultivators have built up particularly good strains of all the profitable varieties. French Black, Boskops and Victoria are most widely grown, with Baldwin and Black Naples to a less extent. The new varieties raised at Westwick by Mr. G. Davison, Col. Petre's Fruit Farms' Manager, will give a further impetus to currant culture, and Daniel's September Black will extend the season. Seabrook's strain of French Black is very popular owing to its resistance to "mite" infection. At present the French Black strain holds the field for popularity, and with good cultivation has produced the heaviest crops and as large a berry as any variety.

In beginning a plantation a clean stock is essential to success. Black currant production is a costly business, and if the expenditure is being made on an inferior strain the results will be only moderately good or possibly show a loss. The scientific opinion on "reversion" leads one to infer that it is a virus disease and probably carried by gall-mites. We have proved that reversion develops with gall-mite infection and is sometimes present in the offspring of the infected bush without the presence of gall-mites. The writer believes that "reversion" is directly due to the toxic influence of the mites, and careful demonstrations have entirely upheld this theory. Plants are raised from cuttings taken at the end of May and propagated in frames. Any external mites carried by these cuttings are killed by dipping and the resulting plants are free from mites. From previous experience we can say that no "reversion" will appear in these plants until they show big buds caused by mite infection. It is the realisation of this factor at the beginning that makes success possible.

Soil Preparation.—Sub-soiling is essential for long life in the plantation. The anchor roots of the bushes need a free range, and the fine fibrous feeding surface roots should not be unduly disturbed when once established. In one year from planting these surface roots permeate the whole top soil in the plantation. In sub-soiling the top soil is turned and a plough with only the share on breaks the bottom of the furrow. A soil that "pans" easily is not good for this crop. Rotted yard manure up to thirty loads per acre is ploughed in the surface furrow. Providing the land was clean before this preparation it is now ready for planting. One would expect that planting after a root crop would give the best plants, but a stubble is prefer-

able as the land can be cleaned after harvest and got ready for early November planting. A root crop is on the land in November and often carted off in wet weather, consequently the soil is lumpy and cannot be made so friable as the stubble land.

Planting and Pruning.—Where the cultivation is carried out by hand labour, 6 ft. by 6 ft. is the usual distance from bush to bush. On large areas where horse labour is to be used 7 ft. by 7 ft., and for the strongest growers 8 ft. by 8 ft. is more satisfactory. After repeated trials one-year-old bushes are found to give the highest satisfaction. These are planted at the stated distances and cut down. One or two cuttings from the tops are inserted between the bushes in the rows. One cutting back will usually secure sufficient breaks from the base. The next season the plants from the cuttings would be cut back, and the only pruning necessary afterwards is to cut out the old branches that do not produce vigorous shoots, *and branches too near the ground*. A rather dense bush tends to greater fruit production, and the weight of fruit opens out the thickest bushes.

The advantage of the closer spacing in the rows is that the earlier pickings yield double the crop and the plantation is easier to keep clean.

Cultivation and Manuring.—After planting the land is got into a good tilth as early as possible the following spring, and this condition is maintained as far as possible during the growing season. This is accomplished by horse-hoeing, and hand-hoeing round the bushes in the rows. Care is taken not to pull the soil away from the plants. If weed growth becomes dense the bushes are seriously checked in development and many plantations are ruined in this way. Intercrops are grown for two or three years; peas, early potatoes, onions or mangolds are most suitable, but these crops must not be allowed to compete with the bushes. Cultivation is for the purpose of maintaining a tilth in the early years and for keeping the plantation free from weeds in after years. In many of the old plantations near the broads the land is top-dressed with reeds annually. This covering prevents weed growth and the surface soil is kept open.

In the older plantations winter soil work by hand labour is required as the bushes cover the land. In young plantations three or four furrows are ploughed next to the rows of bushes leaving the centre open for drainage. Both digging and ploughing near the bushes should be very shallow in order that the

important surface roots do not get disturbed, and care should be taken not to knock the bushes about with the plough or cart. The winter soil working gives sufficient loose soil for summer tillage. From five to ten loads of farmyard manure per acre should be used each year. After the first season's growth, a fork-full is given to each bush as a top-dressing, and repeated in larger doses after fruiting each season. Bone meal is useful as an alternating food and gives texture and weight to the crop. Soot and occasionally lime and soot are applied as a spring dressing. Fish meal has several supporters. Generally speaking, our best cultivators depend chiefly on pig manure and bone meal.

Cost and Production.—The cost of establishing and cultivating an acre of black currants works out as follows:—

Establishing Cost.

Bushes	...	...	...	...	£8 0 0
Manure (30 loads)	...	...	...	...	15 0 0
Soil-working, cleaning and sub-soiling	...			...	2 10 0
Planting and cutting	...	...	...	...	2 0 0
					£27 10 0

Annual Cost.

Labour and horse cultivation	...	...	...	...	£18 0 0
Manure (10 loads)	...	...	...	...	5 0 0
Rent, rates and taxes	...	...	...	...	5 0 0
Chips, etc.	...	...	...	...	13 0 0
Picking	...	...	...	...	20 0 0
Carriage on Fruit	...	...	...	...	13 0 0
					£74 0 0

The cost of chip baskets, picking, and carriage, is expected to fall, but the annual cost is not likely to be less than £50 per acre. The above costs are actual figures from a dependable and successful cultivator. Two tons per acre is a good average yield for a black currant crop. A few growers have more than doubled this weight. With the price of black currants at present rates, the business is worth the risks, but with any big drop in the price, the cultivation of this crop will be unprofitable for a large proportion of cultivators. In view of the weight of jam made per ton of fruit, the cost of black currants to the jam makers has not been so high proportionally as other fruits. The development of this industry has had a beneficial effect on the districts it covers, as the money paid for picking goes into the poorest homes.

Insect and Fungoid Pests.—The most serious trouble still is the gall-mite. It is kept within bounds in many large plantations and "big buds" are difficult to find. This is only possible by ceaseless vigilance—with any neglect or mismanagement the pest shows up in force again. Aphids are not so troublesome as they were. A few years back they seriously damaged crop prospects, but for the past five years the attack from this quarter has been slight. Various caterpillars have given attention to the bushes lately—tortrix, winter, and March moth larvæ have been identified—and a spraying with arsenate of lead has been necessary to check them. The currant root aphid, which is covered by a woolly material like that of the woolly aphid of the apple, infests the root system in many plantations, but no deleterious effects have been observed from this source so far. Among fungi *Cronartium ribicola* is the most serious, and will sometimes appear in July and defoliate the bushes in August. When this happens the next season's crop has always been light. When it begins to show late in September no harmful results are noticeable. The gall-mite is, however, the only serious enemy of the black currant.

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THE RURAL SECONDARY SCHOOL AS A FACTOR IN AGRICULTURAL EDUCATION.

J. G. McINTOSH, B.Sc.,

Samuel King's School, Alston.

As a firm believer in the usefulness of the rural secondary school in a complete system of agricultural education, the writer, some years ago, began to extend the scope of the educational activities of his school to include the provision of lectures to the farming community.

The school is situated in a remote and isolated area of the Pennines. The surrounding country is chiefly permanent grass-pasture largely farmed by small farmers, who rear cattle and sheep. Practically no arable land exists in the district.

The improvement of grass land, the rearing and feeding of stock, the diseases to which stock are subject, are all problems of first-class importance to the district, and it was obvious to the writer that the farming community not only needed the

results of modern scientific research but were eager to acquaint themselves with modern ideas and apply them to the solution of their problems. Contrary to the general view, he has found the farmer willing and eager to learn.

In 1913 a modest scheme of local lectures on farming subjects was prepared and sanctioned by the Governing body of the school. The intervention of the War created difficulties, but enough experience had been gained to show that a very good field of educational work was open.

In 1919 the scheme was extended and lectures were organised during the winter sessions. These have proved popular and beneficial. The attendance is good, many farmers coming long distances in severe weather over mountainous and desolate roads.

The lectures, which usually last about an hour, are followed by questions and interchange of opinions. This is a valuable feature and not only the audience but lecturers have gained first-hand information of a practical and important nature. Facilities are given to farmers to consult the lecturer on problems which have arisen, and it is becoming quite a common feature for lecturers to visit farms in the neighbourhood and study the problem on the spot. During the summer, excursions are organised to places of interest to the farmers.

In this way it has been possible to bring to many farmers the advisory help of the central agricultural college for the area (Armstrong College, Newcastle-on-Tyne), and of the Newton Rigg Farm School.

In framing a scheme of lectures it is important that the subjects should have a direct bearing on the type of farming of the area, that the lecturers should be men of tact and good practical knowledge, and that they should avoid scientific jargon. Men of outstanding authority in a particular subject are much appreciated, and where possible we have endeavoured to obtain their services.

The cost of the scheme has been met in the following way. The County Education Authority of Cumberland allocates a yearly grant to the Agricultural Department of Armstrong College, Newcastle-on-Tyne. On account of this grant the county receives many privileges from the College, and as the result we have been able to secure the valuable services of Professor D. Gilchrist and his staff. Secondly, the Newton Rigg Farm School is jointly financed by Cumberland and Westmorland, and we have been greatly indebted to Mr. Lindsay Robb, the principal, for lectures, advice and lecturers.

On the whole, the scheme has cost the school little, while the educational return has been great. Incidentally the younger generation receives more encouragement to attend farm schools, and the farmer has seen that money spent on secondary education in this area is not a vain thing.

The following examples of lectures already given may be of interest :—

Grassland and its Improvement.
 Breeding of Sheep, especially in relation to the Improvement of Wool.
 Sheep Scab and Sheep Dipping.
 Contagious Abortion.
 Economical Calf-rearing.
 The Production of Grade A Milk.
 Foodstuffs and their Value.
 Recent Progress in Veterinary Research.
 English Wool and its Improvement.
 The Present Supplies of Concentrated Manures.
 Manures, their Use and Abuse.

As lecturers we have had Professor Gilchrist, M.Sc., Sir Daniel Hall, K.C.B., F.R.S., Professor A. F. Barker, M.Sc., W. Jackson Young, Esq., F.R.C.V.S., Professor Cosser Ewart and many others.

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BREEDING ANGORA RABBITS FOR WOOL.

In the issue of this *Journal* for October, 1916, an article appeared on "The Rearing of Angora Rabbits for their Wool," giving a comprehensive account of the methods and conditions necessary for successful wool production as obtaining in France, where it forms a profitable small industry. In view of the increasing interest which is being taken in this subject the Ministry has caused inquiries to be made with regard to the breeding of Angora Rabbits for wool in this country, and the following additional information has been obtained by one of the Ministry's Inspectors.

Clipping.—The usual method of securing the wool crop is said to be by clipping with an ordinary pair of scissors, carefully done so as to secure the fullest possible length of the staple. Plucking, it is stated, is only satisfactory when the rabbit is fully in moult, and it is not easy to gauge when this condition exists. The method of test is to pull out about a dozen strands together. If the animal is ripe for plucking these should come out easily and without leaving any sore

appearance on the skin. The times of moulting vary greatly and depend, it is thought, much on the condition of the parents when mating takes place. With parents "tight" in coat it is believed that the progeny will moult less frequently and the wool will, therefore, be longer and of greater value.

Crops.—It is desirable to aim at about three crops of wool a year from each rabbit—that is to say, a young rabbit born in the autumn would be clipped at about 4 months old and may be expected to give two more crops within the 12 months.

Housing.—If kept in any numbers, the does can be put together when clipped, unless they fight, but when in coat each rabbit must be kept in a separate hutch, which should not measure less than 2 ft. 6 in. by 2 ft. by 1 ft. 6 in. high. Angora rabbits are said to be hardy and prolific if kept free from damp or draught. For bedding, wheat straw cut into 9 in. lengths is suitable. Sawdust (unless covered with wheat straw), oat straw and barley straw are unsuitable as they get entangled in the wool.

Grooming.—The rabbits need brushing once daily to keep the coat from matting, and a brush with short stiff bristles fixed in a pneumatic base is recommended. The wool which comes away on the brush is saved.

Feeding.—Mashes and meal are unnecessary, green food, clover hay and good whole oats meeting all requirements.

Marketing of Wool.—With regard to results, the average Angora rabbit produces 12 oz. of wool per annum, and it is reckoned that at present prices an average net profit of 20s. per annum is realised. It is not known that there are any persons in this country breeding Angoras as a whole-time business, or on a large scale, but it is said that there is no difficulty whatever in disposing of wool. The Ministry has been informed that Mr. J. Holmes, Hon. Secretary, Universal Angora Rabbit Society, of 44, Old Birch, Darwen, is willing to accept consignments of wool, in parcels of not less than $\frac{1}{2}$ lb., provided it is clean and to some extent graded, but only white wool is wanted at present. Mr. Holmes has been appointed by the Society to dispose of wool on behalf of members and others, and the wool is consigned to a spinner who is stated to have agreed to take all he can get up to a quantity representing the wool from 10,000 rabbits. The price for the best wool from white Angora rabbits has increased lately, and is stated to have been as much as 40s. per lb. in January last.

* * * * *

GOOSE-KEEPING FOR FEATHERS AND SKINS.

THE rearing of geese for the production of feathers, down, and dressed skins, has been practised in Poitiers for several centuries and has led to the breeding of a goose especially adapted for the purpose. The feathers and down are plucked from the goose at different stages during its growth, and are sold for millinery and bedding purposes. The dressed skins are used in the manufacture of so-called "furs" and of delicate powder puffs, some of the best skins fetching as much as 20 francs each, and the carcasses are sold for the table.

The total output of skins from the district is estimated at 12,000 dozen per annum at a value of two million francs. The estimated value of the feathers is put at another two million francs, and the flesh at eight million francs.

Characteristics of the Poitou Goose.—The Poitou Goose is reputed to be superior for the purpose to any other of the white breeds in Europe, in having snow white plumage without any trace of black or grey. An abundance of long, white, fine down is carried upon the breast.

The bird is compact, rather short, broad and deep in body, short on the leg, with a relatively long neck. The head is rather round and short, with an elongated beak of a reddish colour in the adult. The young ganders average 14 lb. and geese 12 lb. in weight, whilst the adults are perhaps 2 lb. heavier. The goose at maturity will produce 20-50 eggs a year. Although not a prolific layer the breed possesses all the characteristics for economical production of skins and flesh, and is an active and good forager.

Breeding.—Young geese are bred and reared by farmers, who raise flocks of from 50 to 100 young birds annually. The general practice is to retain only four geese, the requisite number for mating with a gander, although in some cases five can be mated. The breeding flocks are thus limited, owing to the fact that the bellicose nature of the ganders interferes with fecundity if more than one is kept.

For breeding, the birds should be over two years of age, and it is well to replace them at seven or eight years. The heaviest birds are seldom selected for reproduction, a gander of about 15½ lb. weight being mated to geese weighing 13 lb. The matings are made from 6 to 8 weeks before the first eggs are

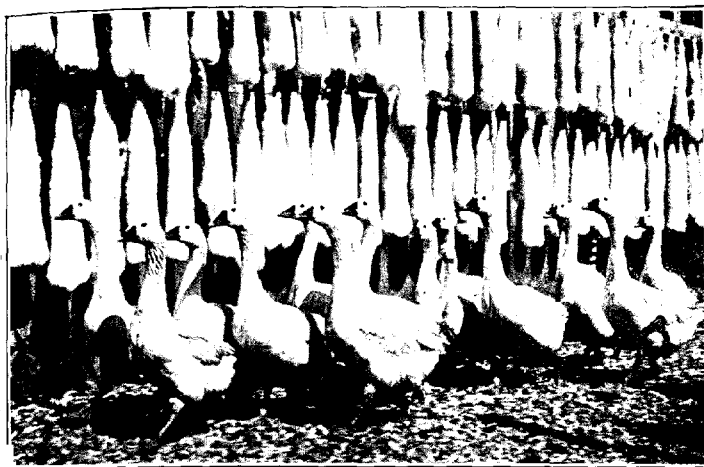


FIG. 1. -A group of White Geese of Poitou, showing also the tanned skins.



FIG. 2. -The tanned skins bleaching in the sun.

expected. Grass and cabbage constitute the daily diet of the adult stock, supplemented with a small ration of oats during the breeding season to induce egg production.

Hatching and Rearing.—Artificial hatching is not practised. The first laying of the goose is from 12-15 eggs, and since the second batch of 6-8 eggs is late, it is generally found better to allow the goose to sit upon her own eggs. The first batch of 10-12 eggs is, however, sometimes entrusted to a turkey or to hens, if there is a prospect of the goose continuing to lay.

The main hatches are out by the end of March, at which period each breeder has from 35-50 goslings. It is interesting to note, as an instance of the practical nature of the people engaged in this industry, that the food resources of the holding are reckoned up at this time, and the flock reduced by the sale of a portion of the goslings at 15 days old, if it is found that the natural resources of the holding are insufficient for the flock hatched.

The goslings require little attention. Shelter from sun and rain is important as the young birds are subject to sunstroke and susceptible to dampness. The goslings are not allowed to enter water before they are 15 days old.

Feeding is simple and economical and the result of long experience. The food given after 36 hours consists of bran and nettles finely chopped and moistened with water. Cabbage leaves are also used, and at four to five weeks old a small quantity of oats are added. This assists the growth of the wing feathers, and at eight weeks, when the wings cross, this addition of oats to the diet is very necessary. With the foraging in meadows and this simple feeding the goslings reach a weight of 6-7 lb. at eight weeks old. The birds are seldom fattened, as fattening detracts from the value of the skin. Carrots are, however, sometimes given with the object of fattening.

After reaching 15 days old the goslings are allowed on to water and the whiteness of the feathers is attributed to frequent bathing in the waters of this region—waters which contain traces of salts of lithia.

Plucking.—The young birds are usually plucked three times, and produce about $\frac{1}{4}$ lb. of bedding feathers, in addition to down, at each plucking.

Marketing.—After setting aside geese required for future breeding, the young geese are taken to special markets for sale alive. It is most necessary to choose the time for market-

ing exactly eight weeks after the previous plucking in order to effect the marketing of the skin in fit condition.

Skins.—The killing and skinning of the goose is carried out by collectors or poulterers. The latter is done while the carcass is still warm, the feathers being plucked from the skin and the down left on. The skins are dried for 10-15 days, after which they are packed and sold in dozens, following which they are specially cured and prepared, to produce the white and fluffy appearance which is their chief value.

Feathers.—The large feathers of the wings and tail are used for the manufacture of artificial wings, or the tail feathers are split for use in feather boas. The ends of the quills are made into toothpicks. The crop feathers are used in making artificial birds or for ornaments, and finally the remains of the wings are formed into household dusters.

In such a specialised industry developed over a long period, as is often the case, the methods employed are practical and economical, and appear simple when related. It is, nevertheless, obvious that the skill and knowledge acquired by long practice are an essential part of the industry, and even the special goose, in unskilled hands, would not yield the same desirable results. It may also well be that the local conditions have some special bearing upon successful production, and the reputation which the breeders of Poitiers have won is not easily to be imitated.

Geese are, however, the most simple of all poultry stock to manage, as pasture land supplies almost all their food, and they are especially adaptable to the small farmer, since very little capital or labour is required.

The information in this account has been obtained from an article by M. Legendre in the *Revue de Zootechnie* for 15th November, 1922, and an article by M. Charon in the *Journal d'Agriculture Pratique*, 1st July, 1922. The illustrations are reproduced from the latter article by kind permission of the editor.

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OFFICIAL SEED TESTING, 1921-22.

THE Annual Report of the Official Seed Testing Station will be published by the National Institute of Agricultural Botany in the "Technical Record" for 1922, which will shortly be available. The following notes summarise the results during the season ending 31st July, 1922.

The number of samples received for testing was 25,822, an increase of over 2,000 on any previous season's total. In March, 5,185 samples were submitted. The number of farmers using the Station was 35 per cent. higher than in the season of 1920-21. There was a large increase in the number of samples of cereal and red clover seeds received, but a decrease in samples of vegetable seeds; other kinds showed little change.

As might have been expected after the dry summer of 1921, home-saved seed was of better quality than usual. The main points of interest are set out below:—

Cereals.—The germination of wheat and barley was well above the average, and that of oats and rye about equal to the average of previous years. Only $2\frac{1}{2}$ per cent. of the wheat samples showed germination below 90 per cent. There was a very large increase in the number of samples of wheat affected by bunt or showing traces of ear-cockles, but there was much less ergot in rye.

Roots and Vegetables.—The germination was on the whole slightly above the average, but parsnip, carrot and onion samples were of relatively poor growth. Mangold and beet were of high quality.

Clovers.—English red clover showed an average germination of 83.6 per cent. as against an average for the past four years of 76.3 per cent. Its purity showed improvement also, this being most marked in the case of injurious weed seed content. Whereas in the two previous seasons 8.1 and 7.4 per cent. of samples of English red contained 1 per cent. or over of injurious weed seeds, the figure for 1921-22 was below 1 per cent. English white clover showed a similar but less marked improvement. Sainfoin was of better quality than in any of the four previous seasons. Czecho-Slovak clovers, which were of low purity in the two previous seasons, showed considerable improvement in this respect.

The dodder content of all clovers was slightly above that of the previous season—this was probably due to the fact that the climatic conditions for ripening the seed were more favourable than usual.

Grasses.—It is rather difficult to draw any close comparison between the purity and germination figures for the past season and those for previous seasons, since there has been a radical change in the manner of testing. Now that the Continental method is being used lower purity figures and higher germination figures result. Making allowance for this, however, it

seems most probable that ryegrasses were scarcely up to the usual standard, that Timothy and meadow fescue were of average quality, and that cocksfoot and dogstail were about the average. It might perhaps be noted that the new crop ryegrasses were of excellent quality, though short in quantity, but the average was lowered by the large amount of old seed on the market.

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MONTHLY NOTES ON FEEDING STUFFS:

FEEDING FOR BACON PRODUCTION.

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Ministry of Agriculture and Fisheries.

In the March issue of the *Journal*, it was pointed out that poor quality bacon results from the use of unsuitable mixtures of feeding stuffs, particularly towards the end of the fattening period. It is, however, possible to produce the wrong type of carcass from a pig, which, from the breeding standpoint, has all the points necessary for the formation of ideal bacon, even though suitable feeding stuffs are used. The ideal side, from the bacon curer's standpoint, is one weighing 50-60 lb. when finished, with good ham, thick streaking and good loin, the middle weighing a few pounds more than the ends. Above all, the proportion of lean to fat must be high, and the back fat should never be more than $1\frac{1}{2}$ in. in thickness. A bacon pig of the right type, and weighing 200 lb. live weight, should kill out at 160 lb. dressed weight at about 5-6 months old. Whether the pig kills out at the right proportion of lean to fat depends largely upon the judgment of the feeder in maintaining the right proportion between the albuminoids and non-albuminoids throughout the growing and fattening period. In fattening the pig, the pig feeder is dealing with an animal in an actively growing state, and it is therefore necessary to provide adequately for the growth of the animal as well as for fattening. This is a very important point, and an error in feeding during the early stages of fattening is not easily put right later. If pigs receive insufficient protein (albuminoids) during the early stages they will kill out unduly fat at 200 lb. live weight. In the early stages of the pig's life, the nutritive ratio of the ration should be as narrow as 1:3 or 4, widening out in the latter stage of

DESCRIPTION.	Price per Qr.		Price per		Manurial Value per Ton.	Cost of Food Value per Ton.	Starch Equiv. per 100 lb.	Price per Unit, Starch Equiv.	Price per lb. Starch Equiv.
	s.	lb.	Cwt.	£ s.					
Wheat, British	41/6	504	9/3	9 5	0 18	8 7	71.6	2/4	1.25
Barley, British Feeding	27/0	400	7/7	7 12	0 14	6 18	71	1/11	1.03
" Danubian "	29/6	—	8/3	8 5	0 14	7 11	71	2/2	1.16
" Persian "	28/9	—	7/6	7 10	0 14	6 16	71	1/11	1.03
Oats, English White	30/-	336	10/-	10 0	0 16	9 4	59.5	3/1	1.65
" " Black & Grey	27/0	—	9/0	9 0	0 16	8 4	59.5	2/9	1.47
" Scotch White	36/-	—	12/-	12 0	0 16	11 4	59.5	3/9	2.01
" Canadian No. 2	—	—	—	—	—	—	—	—	—
" " Western	30/0	320	10/6	10 10	0 16	9 14	59.5	3/3	1.74
" " No. 3	28/3	—	9/11	9 18	0 16	9 2	59.5	3/1	1.65
" " Feed	27/6	—	9/7	9 12	0 16	8 16	59.5	2/11	1.56
" American	25/3	—	8/10	8 17	0 16	8 1	59.5	2/8	1.43
" Argentine	25/0	—	8/9	8 15	0 16	7 19	59.5	2/8	1.43
Maize, Argentine	38/6	480	9/0	9 0	0 15	8 5	81	2/-	1.07
" American	37/6	—	8/9	8 15	0 15	8 0	81	2/-	1.07
Beans, English Winter	46/-	532	9/8	9 13	1 18	7 15	67	2/1	1.25
" Rangoon	—	—	8/9	8 15	1 18	6 17	67	2/1	1.12
Peanut, English, Dan	56/-	504	12/5	12 8	1 13	10 15	69	3/1	1.65
Rye, Home-grown	36/-	—	8/-	8 0	0 18	7 2	71.6	2/-	1.07
Millers' offals—	—	—	—	—	—	—	—	—	—
Bran, British	—	—	—	7 2	1 11	5 11	45	2/6	1.34
" Broad	—	—	—	8 5	1 11	6 14	45	3/-	1.61
Fine middlings (Imported)	—	—	—	9 0	1 6	7 14	72	2 2	1.16
Coarse middlings (British)	—	—	—	7 2	1 6	5 16	64	1/10	0.98
Pollards (Imported)	—	—	—	6 12	1 11	5 1	60	1 8	0.89
Barley Meal	—	—	—	10 0	0 14	9 3	71	2/7	1.38
Maize	—	—	—	10 5	0 15	9 10	81	2/4	1.25
" Germ Meal	—	—	—	9 5	1 2	8 3	85.3	1/11	1.08
" Gluten-feed	—	—	—	9 5	1 12	7 13	75.6	2/-	1.07
Locust Bean Meal	—	—	—	8 7	0 11	7 16	71.4	2/2	1.16
Bean Meal	—	—	—	12 0	1 18	10 2	67	3/-	1.61
Fish	—	—	—	16 10	5 0	11 10	53	4/1	2.32
Linseed	—	—	—	20 15	1 16	18 19	119	3/2	1.70
" Cake, English (9 7/8 oil)	—	—	—	12 17	2 5	10 12	74	2/10	1.52
Cottonseed Cake, English (Egyptian Seed)	—	—	—	7 11	2 0	5 11	42	2/8	1.43
" " (5 1/2 oil)	—	—	—	7 10	2 0	5 10	42	2/7	1.38
" " (5 1/2 oil)	—	—	—	8 15	1 15	7 0	73	1/11	1.03
Coconut Cake (6 7/8 oil)	—	—	—	7 0*	1 7	5 13	75	1/6	0.80
Palm Kernel Cake (6 7/8 oil)	—	—	—	—	—	—	—	—	—
" " Meal (2 7/8 ")	—	—	—	5 15	1 8	4 7	71.3	1/3	0.67
Feeding Treacle	—	—	—	4 5	0 9	3 16	51	1/6	0.80
Brewers' grains, dried, ale	—	—	—	7 17	1 8	6 9	49	2/8	1.43
" " " porter	—	—	—	7 10	1 8	6 2	49	2/6	1.34
" " wet, ale	—	—	—	1 12	0 11	1 1	15	1/5	0.76
" " wet, porter	—	—	—	1 8	0 11	0 17	15	1/2	0.62

* At Liverpool.

NOTE.—The prices quoted above represent the average prices at which actual wholesale transactions have taken place in London, unless otherwise stated, and refer to the price ex mill or store. The prices were current at the end of January and are, as a rule, considerably lower than the prices at local country markets, the difference being due to carriage and dealers' commission. Buyers can, however, easily compare the relative prices of the feeding stuffs on offer at their local market by the method of calculation used in these notes. Thus, suppose coconut cake is offered locally at £10 per ton. Its manurial value is £1 15s. per ton. The food value per ton is therefore 48 5s. per ton. Dividing this figure by 73, the starch equivalent of coconut cake as given in the table, the cost per unit of starch equivalent is 2s. 8d. Dividing this again by 22.4, the number of pounds of starch equivalent in 1 unit, the cost per lb. of starch equivalent is 1.21d. A similar calculation will show the relative cost per lb. of starch equivalent of other feeding stuffs on the same local market. From the results of such calculations a buyer can determine which feeding stuff gives him the best value at the prices quoted on his own market. The manurial value per ton figures are calculated on the basis of the following unit prices:—N, 15s. 2d.; P₂O₅, 4s. 7d.; K₂O, 2s. 10d.

fattening to 1: 5 or 6. Adherence to these ratios will produce the right type of carcass, provided, of course, that a good type of bacon pig is being used. From a practical standpoint, the pig feeder will need to take care that sufficient food rich in proteins is included in the mixtures fed. The home-grown feeding stuffs, wheat, oats, barley and rye, all have too wide a nutritive ratio and need to be used in conjunction with a feeding stuff rich in protein, such as peas, whey, meat meal, dried blood, etc. The proportions in which these several feeding stuffs require mixing to obtain the best results can be worked out from the tables given in Miscellaneous Publication No. 32. Rations for Live Stock.

FARM VALUES.

CROPS.	Value per Ton on Farm.	Mineral Value per Ton.	Food Value per Ton.	Starch Equivalent per 100 lb.	Value per unit S.E.	Market Value per lb. S.E.
	£ s.	£ s.	£ s.		s. d.	d.
Wheat	8 1	0 18	7 3	71·6	2/0	1·07
Oats	6 15	0 16	5 19	59·5	2/0	1·07
Barley	7 16	0 14	7 2	71·0	2/0	1·07
Potatoes	2 0	0 4	1 16	18·0	2/0	1·07
Swedes	0 17	0 3	0 14	7·0	2/0	1·07
Mangolds	0 15	0 3	0 12	6·0	2/0	1·07
Good Meadow Hay	4 19	0 16	4 3	31·0	2/8	1·43
Good Oat Straw	2 13	0 8	2 5	17·0	2/8	1·43
Good Clover Hay	5 9	1 4	4 5	32·0	2/8	1·43
Vetch and Oat Silage	2 1	0 8	1 13	14·0	2/4	1·25

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PRICES OF ARTIFICIAL MANURES.

NOTE.—Unless otherwise stated, prices are for not less than 2-ton lots f.o.r. in towns named, and are net cash for prompt delivery.

DESCRIPTION	Price per ton				Cost per Unit at London
	Bristol	Hull	L'pool	L'ndn	
	£ s.	£ s.	£ s.	£ s.	s. d.
Nitrate of Soda (N. 15½ per cent.) ...	14.10	14. 5	13.10	13.12	17. 7
" " Lime (N. 13 per cent.) ...	...	...	...	12. 5	18.10
Sulphate of Ammonia, ordinary (A. 25¼ per cent.)	16. 0*	16. 0*	16. 0*	16. 0*	(N)15. 5
" " " neutral (A. 25¼ per cent.)	17. 3*	17. 3*	17. 3*	17. 3*	(N)16. 2
Kainit (Pot. 12½ per cent.) ...	...	...	...	2. 0	3. 2
" (Pot. 14 per cent.) ...	2. 5	2. 1	2.12	2. 7	3. 5
Sylvinit (Pot. 20 per cent.) ...	...	...	...	3. 0	3. 0
Potash Salts (Pot. 30 per cent.) ...	...	...	...	4. 5	2.10
Muriate of Potash (Pot. 50 per cent.)	9.10	8.10	8. 0	8. 5	3. 4
Sulphate of Potash (Pot. 48 per cent.)	...	12.15‡	11.15	11.15	4.11
Basic Slag (T.P. 30-32 per cent.) ...	3.15§	...	...	3.17§	2. 6
" " (T.P. 26 per cent.) ...	...	2.12§	...	...	...
" " (T.P. 24 per cent.) ...	...	2. 8§	2. 7§	...	...
" " (T.P. 20-22 per cent.) ...	...	2.12§	2. 5§	2.15§	2. 7
" " (T.P. 16-18 per cent.) ...	...	2. 2§	...	2. 0§	2.11§
Slag Phosphate (T.P. 60 per cent.) ...	6. 7§	...	...	6.15§	2. 3
" " (T.P. 50 per cent.) ...	...	...	...	5.15§	2. 4
" " (T.P. 40 per cent.) ...	4. 7§	...	...	...	...
Superphosphate (S.P. 35 per cent.) ...	4. 7	...	4. 5§	4. 0	2. 3
" " (S.P. 30 per cent.) ...	3.17	3. 7	3.15§	3.12	2. 5
Bone Meal (T.P. 45 per cent.) ...	9.10	9.10†	9. 0	8.12	...
Steamed Bone Flour (T.P. 60 per cent.)	8.10†	7.10†	7.10	6.17	...
Fish Guano (A. 9-10, T.P. 16-20 per cent.)	12.15	...	12. 5	13. 5	...

Abbreviations: N.=Nitrogen; A.=Ammonia; S.P.=Soluble Phosphate; T.P.=Total Phosphate; Pot.=Potash.

* Delivered in 4-ton lots at purchaser's nearest railway station.

† Delivered (within a limited area) at purchaser's nearest railway station.

‡ At Goole.

§ Prices include cost of carriage from works to town named. Hull prices include delivery to any station in Lincolnshire or Yorkshire. Cost to purchasers in other districts will be greater or less according to the distance of different purchasers from the works.

THE ADVISORY SERVICE OF THE MINISTRY.

THERE have recently been made a number of appointments of Agricultural Advisory Officers at Colleges and Universities, and it will probably be convenient to farmers and others interested to have a full list of officers at the thirteen advisory centres in England and Wales. The counties served by each officer are as stated below:—

Centre.	Counties.	Name of Adviser.	Subject.
BRISTOL:	Gloucester	T. Wallace, M.Sc.,	Chemistry
Agricultural and Horticultural Research Station	Hereford	A.I.C.	
	Somerset	E. Ballard, B.A.	Entomology
	Wiltshire		
	Worcester		

<i>Centre.</i>	<i>Counties.</i>	<i>Name of Adviser.</i>	<i>Subject.</i>
CAMBRIDGE: School of Agriculture	Bedford	F. R. Petherbidge, M.A. W. S. Mansfield, B.A. W. A. R. Dillon Weston, B.A. Mycology	Biology Chemistry Mycology
	Cambridge		
	Essex		
	Hertford		
	Huntingdon		
	Isle of Ely		
	Lincoln (Holland)		
	Lincoln (Kesteven)		
	Norfolk		
	Northampton		
	Soke of Peterboro'		
	Suffolk, East		
	Suffolk, West		
LEEDS: University Dept. of Agriculture	Yorkshire, E. Riding	T. H. Taylor, M.A. J. A. Hanley, Ph.D. W. A. Millard, B.Sc.	Entomology Chemistry Mycology
	" N. "		
	" W. "		
MANCHESTER: University	Cheshire	Kenneth M. Smith E. Holmes Smith, B.Sc.	Entomology Mycology
	Lancashire		
NEWCASTLE-UPON- TYNE: Armstrong Coll. Agricultural Dept.	Cumberland	S. H. Collins, M.Sc. R. A. Harper Gray, M.A., M.Sc.	Chemistry Entomology
	Westmorland		
	Durham		
	Northumberland		
NEWPORT (SALOP): Harper Adams Agricultural Coll.	Salop	N. C. Preston, B.Sc.	Mycology
	Stafford		
	Warwick		
NEWTON ABBOT: Seale Hayne Agricultural Coll.	Cornwall	W. E. H. Hodson, A.R.C.S.	Entomology
	Devon		
READING: University Coll.	Berkshire	F. O. Mosley, F.L.S. W. Buddin, B.A.	Entomology Mycology
	Buckingham		
	Dorset		
	Hampshire		
	Isle of Wight		
	Middlesex		
	Oxford		
SUTTON BONINGTON (NOTTS.): Midland Agric. and Dairy Col- lege	Derby	A. Roebuck H. H. Stirrup, M.Sc.	Entomology Mycology
	Leicester		
	Lincoln (Lindsey)		
	Nottingham		
	Rutland		
WYE: South Eastern Agric. College	Kent	F. V. Theobald, M.A. E. S. Salmon, F.L.S. W. Goodwin, D.Sc.	Entomology Mycology Chemistry
	Surrey		
	Sussex, East		
	" West		
ABERYSTWYTH: University Coll. of Wales	Brecon and Radnor	T. W. Fagan, M.A., F.I.C. J. R. W. Jenkins, B.Sc. D. W. Davies, B.Sc.	Chemistry Entomology Mycology
	Cardigan		
	Carmarthen		
	Merioneth		
	Montgomery		
	Pembroke		

<i>Centre.</i>	<i>Counties.</i>	<i>Name of Adviser.</i>	<i>Subject.</i>
BANGOR: University Coll. of North Wales	Anglesey Carnarvon Denbigh Flint	G. W. Robinson, M.A. C. L. Walton, M.Sc. T. Whitehead, A.R.C.S.	Chemistry Entomology Mycology
CARDIFF: University Coll. of South Wales and Monmouth	Glamorgan Monmouth	N. Bissett, M.R.C.V.S. J. Rees, B.A., B.Sc. H. W. Thompson, M.Sc.	Veterinary Science Mycology Entomology

It will be observed that at most centres there are an entomologist and a mycologist, and it is expected that within the next twelve months this will be the case at every centre. Chemists have been appointed at six centres only, but elsewhere arrangements are generally made to supply advice which requires expert knowledge of agricultural chemistry, although no special appointment has been made. At only one centre (Cardiff) has an adviser in veterinary science been appointed, but it is proposed to provide for the appointment of veterinary advisers at other centres where the local conditions appear specially to demand it. It is not the intention that veterinary advisers should interfere with the legitimate practice of veterinary practitioners and consultants, but give advice and conduct research in subjects of public interest—epidemics or cases of high and long continued mortality in a flock or herd. This branch of the advisory service will be linked up with the Research Institutes in Animal Pathology. Another development already far advanced is the appointment of agricultural economists, who will act in the capacity of advisory officers, particularly in the matter of costings, in their districts: it is hoped that the scheme, which is not yet quite complete, will be dealt with in the May issue of the *Journal*. It may be mentioned, however, that the work will be conducted from five centres, at each of which an economist (whose name is given below) will be responsible for the scheme in the areas indicated, respectively:—

- OXFORD—Institute of Agricultural Economics: Director, C. S. Orwin, M.A.
(Area, west of Reading area, boundary yet to be precisely defined. The Institute will act, not only as a provincial centre, but as the co-ordinating centre of the whole scheme.)
- CAMBRIDGE—J. A. Venn, M.A. (Area as in Table above.)
- LEEDS—A. G. Ruston, B.A., D.Sc. (Area as in Table above.)
- READING—J. S. Simpson, B.Sc. (Area to be adjusted with Oxford.)
- WYE—J. Wyllie, B.Sc. (Area as in Table above.)

The Ministry's general scheme for the provision of advice is explained in Leaflet No. 279, and a number of counties and some advisory centres have issued pamphlets giving details of the arrangements in particular areas. As a rule a farmer in need of advice will first turn to the Agricultural Organiser for his

County. This officer deals at once with any questions relating to ordinary farming practice, but if the difficulty is of a specialist character, one to which no easy solution is forthcoming, or one that necessitates a little inquiry on the spot or a minor investigation of the circumstances, then it falls to be dealt with by the appropriate Advisory Officer.

It will be seen that a part of the work of these specialist Advisory Officers comes to them either directly or indirectly from the farmer who requires assistance on some specific point: but an equally important part of their work reaches them from the Research Institutes. The aim of Research Institutes is, in general, national, i.e., research is carried out without special reference to locality and soil. Sooner or later, however, this research reaches a stage at which application to local conditions is required. It is, therefore, the duty of the advisory officers to interpret the work of Research Institutes in accordance with local needs, to supplement it by the investigation of local problems and to ensure as far as possible that local agricultural methods keep pace with the progress made in agricultural research.

It should be explained that as a consequence of the administrative responsibility placed on the Ministry in connection with the control of certain plant diseases, the plant pathological Advisory Officers, besides discharging the duties mentioned above, act also as the Ministry's intelligence officers.

To prevent duplication of effort in the provision of advice, it has been arranged that provincial centres will hold periodical meetings between the advisory officers and the organisers working in the area covered by a College. In this way it is hoped to ensure both an exchange of information and common action when that appears desirable in order to meet some special need that has arisen in the area. Secondly, in order to secure co-ordination between the Technical Officers of the Ministry and the Advisory Service, especially in connection with plant diseases, meetings of the Ministry's Technical Officers and the Advisory Officers are held periodically.

* * * * *

The index numbers of prices of agricultural produce in England and Wales show that on the whole, average prices during February were lower than in January, the increase compared with the corresponding month in 1911-18 being 63 per cent. against 68 per cent. in January. Most commodities

**The Agricultural
Index Number.**

were relatively cheaper than in January, the decline in the case of eggs, being exceptionally sharp.

It has been suggested to the Ministry recently that these index figures give a more favourable impression than the position of the arable farmer really warrants. It will be understood that the average index figure takes account of the principal farm commodities, due allowance being made for the proportionate value of the different products; for instance, more weight is given to live stock and milk than to corn, because on the average the former products bulk more largely in the farmer's receipts than the latter. Individual farmers or groups of farmers may be differently affected, and it is not suggested that the index number can be regarded as accurately representing every type of farming. It is merely an average, and certain classes of agriculturists are no doubt less favourably situated than the average.

The following table shows the percentage increases in each month since January 1920 :—

PERCENTAGE INCREASE COMPARED WITH THE AVERAGE OF THE CORRESPONDING MONTH IN 1911-13.

MONTH.	1920.	1921.	1922.	1923.
January	200	183	75	68
February	195	167	79	63
March	189	150	77	—
April	202	149	70	—
May	180	119	71	—
June	175	112	68	—
July	186	112	72	—
August	193	131	67	—
September	202	116	57	—
October	194	86	59	—
November	193	79	62	—
December	184	76	59	—

Wheat and barley were cheaper than in January, the former declining by 3d. and the latter by 6d. per cwt., and barley was only 12 per cent. dearer than before the war. Oats continued relatively dearer than wheat or barley, and prices rose slightly, but as the rise was not so great as is usual in February the index number shows a decline. Potatoes were cheaper and sold during February at town markets at 5 per cent. below the pre-war price. Prices of hay showed little variation and town prices were 42 per cent. above those ruling in 1911-13.

Prices of fat cattle, though showing a hardening tendency during February, remained at 61 per cent. above pre-war figures. Fat sheep advanced by $\frac{1}{2}$ d. per lb., but this rise is relatively smaller than is usual at this time of the year and the index

number is therefore reduced. Fat pigs were easier and averaged 88 per cent. more than in 1911-13. Prices of fat stock are on the whole quite as high as a year ago, pigs and sheep being dearer and cattle 6d. per 14 lbs. stone cheaper. Dairy cattle became cheaper during February, and at 67 per cent. above the pre-war price are selling at less money than in any month since September last. Store cattle remained practically unchanged at 36 per cent. above 1911-13, whilst the increases in store sheep and pig prices were relatively less than in the base years. Store pigs at two and a half times the pre-war price remain very dear as compared with the price of fat pigs.

Butter and cheese are much dearer than a year ago, prices of butter being about 20 per cent. and of cheese about 40 per cent. higher than in February 1922. The sharp rise in cheese prices since October has been due to smaller imports, but imports of butter in recent months have not been lower than in the corresponding period of last year. There has, however, been a very active demand for butter in the past few weeks. Eggs declined from an average of 2s. 4½d. per dozen in January to 1s. 8d. per dozen in February and were very little dearer than in March of last year. In February 1922, egg prices were 82 per cent. higher than this year.

The following table shows the average increases during recent months in the prices of the principal commodities:—

PERCENTAGE INCREASE AS COMPARED WITH THE AVERAGE PRICES RULING IN THE CORRESPONDING MONTHS OF 1911-13.

Commodity.	1922				1923.	
	Feb.	Oct.	Nov.	Dec.	Jan.	Feb.
Wheat ...	50	24	32	32	33	28
Barley ...	49	29	34	17	20	12
Oats ...	48	33	38	36	43	39
Fat cattle ...	67	49	48	48	61	61
Fat sheep ...	72	90	87	81	103	97
Fat pigs ...	82	85	94	94	102	88
Dairy cows ...	†	69	74	72	74	67
Store cattle ...	†	30	29	28	36	36
Store sheep ...	†	106	93	83	105	100
Store pigs ...	†	135	148	151	171	154
Eggs...	166	104	98	63	86	46
Poultry ...	80	77	75	86	81	80
Milk ...	117	90	90	90	90	90
Butter ...	41	71	72	73	73	72
Cheese ...	33	36	55	60	85	88
Potatoes ...	122	3	8	7	-1*	-5*
Hay ...	32	45	45	47	43	42

* Decrease.

† Markets for store stock were closed during the greater part of February 1922, owing to foot-and-mouth disease.

THIS scheme is now in operation in the majority of counties in England and Wales. Its object is to provide facilities for

**Egg and Chick
Distribution
Scheme, 1923.**

cottagers, and other individuals who are engaged in poultry-keeping in a small way, to obtain stocks of fowls of good productive capacity from approved breeders in their district. It is designed particularly to help beginners in poultry-keeping. The larger poultry-keeper is, as a rule, fully aware of the importance of using only the best stock, both for egg-production and for table purposes. The small man or the beginner needs to have the advantages of it brought home to him. The scheme has been in operation for several seasons throughout the country, and it is hoped that before many years are over the productive quality of our ordinary poultry stock will have been considerably improved by its help.

That there is a large field for the further development of the poultry industry in this country is evident from the fact that in each of the last three years over £15,000,000 worth of eggs and poultry has been imported into the United Kingdom from countries abroad, most of which remains in Great Britain, whilst there is a large amount (16 million pounds worth in 1920, and 11 million pounds worth in 1921) imported into Great Britain from Ireland.

The details of the scheme include the approval of a breeder of poultry in each district as a "station-holder," from whom eggs and chicks may be bought. Before approval is given, his premises have to satisfy inspection by the County Poultry Instructor. It is an essential condition of this scheme that the eggs and chicks are sold by him to cottagers, etc., at specially favourable prices, which are fixed by the county authorities. The distribution of eggs under the scheme finishes on the 15th May, and that of chicks on the 31st May. Small poultry-keepers who have not done so already should make a point of taking advantage of the scheme, and if they find themselves in difficulties about it, they should send to the Ministry of Agriculture for leaflet No. 389, which will give them all the information they are likely to need.

* * * * *

THE following note has been received from Mr. Charles Mosley, M.B.O.U., Assistant Curator of the Huddersfield Municipal Museum:—

**Weevil Infested
Garlic.**

"Some time ago a large consignment of 'Spanish' garlic was received by a Yorkshire house of wholesale druggists, which proved to be

infested by a weevil. I submitted specimens to the British (Natural History) Museum, and received the information that the name is *Brachycerus cinereus*.

The same firm has for years imported garlic in great quantity but neither before nor since has any of it been affected in this way. This particular consignment was alive with the weevils—all in the imago state, for in the portion that I examined I failed to detect either larvæ or pupæ. The fact that *Brachycerus cinereus* will attack garlic presents an economic proposition against which users of that and similar commodities need to be on their guard."

* * * * *

FROM correspondence received by the Ministry, it would appear that many landowners are under the impression that the terms on which lay tithe rentcharge can be redeemed under the Tithe Act, 1918, at the present time are higher than those for cases in which application was made under the

**Redemption of
Lay Tithe
Rentcharge.**

Act on or before 1st January, 1921. The Ministry desires, however, to point out that, although for the purposes of redemption the "gross annual value" of tithe rentcharge is now 104 per cent. as compared with 100 per cent. before 2nd January, 1921, and the number of years' purchase of the net annual value taken as the amount of the consideration for redemption is now 22 instead of 21, the cost of redeeming lay tithe rentcharge is, as a rule, much less now than in 1920. This is due to the fact that, in arriving at the net annual value of tithe rentcharge for the purpose of calculating the amount of the consideration money for redemption, it is necessary for the Ministry to deduct from the "gross annual value," *inter alia*, the average amount paid or payable by the titheowner in respect of the rentcharge on account of rates during the three years immediately preceding the date of the application to redeem. In this connection it may be noted that the average of the rates paid or payable by lay titheowners for the three years, 1920, 1921 and 1922, is in most parishes considerably higher than the average for the three years preceding 1920. Where the application is made at the present time, the consideration money, calculated as prescribed by the First Schedule to the Tithe Act, 1918, works out in an average case at approximately 12 $\frac{3}{4}$ years' purchase only of the present value of lay tithe rentcharge, as compared with 15 years' purchase in 1920. It is to be observed that lay tithe rentcharge includes tithe rentcharge payable to the Ecclesiastical

Commissioners, Colleges and Municipal Corporations, as well as tithe rentcharge payable to individual lay owners.

Forms and instructions as to redemption procedure are supplied by the Ministry on request.

* * * * *

THE Ministry considers that it is desirable to draw attention to the fact that the use for seed purposes of milled sainfoin has advantages over the use of sainfoin in husk.

Sainfoin—Advantage of Using Milled Seed.

In some districts there may be a prejudice against the use of milled seed, the opinion being held that stocks of the old common sainfoin are more likely to be genuine if obtained in the husk. There does not, however, nowadays appear to be any grounds for this belief. Evidence that has accumulated during the past five years at the Official Seed Testing Station shows that higher purity and germination will usually be obtained from milled than unmilled seed.

The purity of sainfoin in husk is on the average one or two per cent. lower than that of milled seed. Moreover, the nature of the impurity is different. It is difficult entirely to eliminate brome grass, burnet or similar large seeds from unmilled sainfoin, whereas the impurity in the milled seed consists usually of broken fragments of seed.

Unmilled sainfoin always contains a small proportion of husks which are either entirely empty or which contain partially developed seeds. These would be eliminated by milling. Also a healthy seed may have great difficulty in breaking through the husk and may die in the process. It will be clear, therefore, that, other things being equal, a milled sample of seed will have a higher germination than the same sample in husk.

* * * * *

THE Ashby Bosworth Committee has agreed on the payment of adult male workers at the rate of 31s. for a week of 54 hours with overtime at 7d. per hour on weekdays and 10d. per hour on Sundays. The agreement will operate until one month after notice of any revision is given by either side of the Committee.

Conciliation Committees in Agriculture.

The Devonshire Committee has reached a further agreement providing for payment to adult male workers at the rate of 30s. for a week of 51 hours, with overtime rates of 8d. and 10d. per hour for weekdays and Sundays respectively. The agreement

includes rates for male workers under 21 years of age and is operative from 25th March to 29th September. Provision is also made for one short day in every week.

* * * * *

AGRICULTURE ABROAD.

CONDITIONS OF COUNTRY LIFE AND WORK IN FRANCE—ELECTRIC
SILAGE—ACT EXTENDING INDUSTRIAL ACCIDENT
LEGISLATION IN FRANCE.

THE Report of the Finance Commission of the French Chamber given in the *Journal Officiel* (14th November, 1922)

Conditions of Country Life and Work in France.

draws attention to the serious depletion of the countryside in France by the continuous movement of agricultural workers to the towns. The causes, the Commission considers, should not be regarded as uniform, although one of the chief reasons is undoubtedly the attraction of high wages in the towns. It is thought unlikely, on the other hand, that the 8-hour day of industrial workers can hold any strong inducement for migration, as the average day of an agricultural labourer, taken the whole year through, consists of only 8 working hours. It is, however, admitted that "the agricultural worker is less well treated and leads a less agreeable life than the worker in the towns."

Both the farmers' and the workers' representatives have offered schemes for improving the situation of the agricultural worker. The workers suggest that an attempt should be made to stabilise wages, having regard to the cost of living, at a level equivalent to that in industry, and that equal pay should be given for equal work. Hours of work should be regulated on the basis of 8 hours a day with a maximum of 10 hours. They urge that every means should be taken to prevent accidents at work, and where accidents occur adequate compensation should be given. The improvement of accommodation, board and lodging, and the abolition of the present insanitary conditions of working and living are regarded as essential. With regard to unemployment it is proposed to introduce improved methods of cultivation, with better machinery and the constitution of mobile corps of workers, and to organise labour exchanges under joint control. The workers also claim that the growing number of collective agreements and treaties warrant a system of labour inspection by the Ministry of

Labour, and that these inspectors alone should be competent to intervene in the supervision of agreements.

The farmers give their view that it is necessary to increase output in order to increase wages, and recommend schemes which, in their opinion, will effect this object. They propose that municipalities should be empowered to improve country roads, and that drainage and irrigation schemes should be encouraged. In order to train the youth to become an efficient worker it is suggested that rural classes should be introduced in elementary schools, and that the training should be continued on apprenticeship farms. The employers advocate that the basic wage in agriculture should be defined, but oppose the limitation of the working day. In order to facilitate access to the land a system is offered to bring owners and workers together; at the same time questions of remuneration might be settled.

These resolutions correspond only on matters of secondary importance, although each bears evidence of the desire to improve the position of the agricultural worker.

Two Bills have recently been introduced in favour of agricultural workers. The first proposes compensation for farmers' sons when they remain at work with their parents, and also for persons over 25 years upon leaving the farm, if they have worked or lived with their parents for at least 5 years without enjoying the position either of partner or ordinary paid worker. The second Bill, which is well supported, proposes to retain workers on the land by the conversion of all large farms which are inadequately cultivated into small family properties.

The report suggests that it would also be useful to assist with credit schemes to provide working expenses, without which a smallholder finds himself in a most difficult position.

* * * * *

A PROCESS for the curing of silage by electricity has been invented by Th. Schweizer, of Dresden, and is being worked in Switzerland by the Oerlikon Machine Factory.*

**Silage Cured
by Electricity.**

The green forage, just as it is mown, is chopped up and placed in a cement receptacle. It then lies between two electrodes and is heated to about 120° F. by the electric current. According to the patentees this passage of the electric current kills the vegetable cells and the bacteria of the

* See Bulletin de l'Office Vétérinaire et de la Division de l'Agriculture (Switzerland), XXIII an. No. 19. Berne 15 Mai, 1922.

forage, the resulting product being of perfect quality, keeping well, and suffering no loss.

In an experiment 14 tons 18 cwt. 45 lb. of green forage was tested electrically and produced 11 tons 15 cwt. 87 lb. of silage (79 per cent.). The material was put in the silos between 24th September and 1st October, and was taken out between 27th December and 15th January.

Feeding trials were carried out with twelve dairy cows in which the "electric silage" was tested against ordinary silage. The live weight of the animals varied very little during the feeding period. As regards milk, after making adjustments (including allowance for waning lactation) the yield during the "electric silage" period is stated to have shown an increase per head per day of about $\frac{3}{4}$ lb. The material was not liked by the cows. The milk was only used for making Emmenthal cheese.

The results of the trial of this silage and of trials of ordinary silage showed that silage of any kind caused serious disturbances in the manufacture of Emmenthal cheese. These troubles are caused by the fact that gas-producing butyric acid bacilli are present in the excrements and pass thence into the milk.

The general conclusions were, shortly, as follows:—The claims of the patentees were not borne out by the experiments. The practical introduction of the process, even allowing liberally for the advantages which the experiment has established, would still meet with great difficulties both economical and practical. The installation in Switzerland of electric silos cannot at present be recommended.

* * * * *

THE "*Journal Officiel*," of the 16th December, 1922, reports the definite adoption by the French Chamber of the Bill for extending industrial accident legislation to agricultural undertakings. The Act of 1899 contains regulations concerning accidents arising from the use of agricultural machinery driven by stationary motors, but otherwise agricultural workers had no special guarantee against occupational risks.

**Industrial Accident
Legislation
in France.**

The new Act provides that legislation concerning the responsibility for industrial accidents shall, in principle, cover both manual and non-manual workers and domestic servants (except

those employed exclusively on personal services to the employer) employed in agricultural undertakings of any kind, including undertakings for the breeding and training of animals, store-houses, or sale rooms, etc., connected with an agricultural undertaking if the latter is the main undertaking.

The scope of the Act does not extend to undertakings worked by the owners alone or with the assistance of their families and relations even if outside labour is occasionally employed, but special insurance policies can be obtained for these cases. Foreign workers who do not reside on French territory are not entitled to the daily benefits applicable in the case of accident unless reciprocal treatment is provided by international treaty.

The Act will come into operation one year after the publication of the administrative decrees for its application which must be issued within six months of the promulgation of the Act.

* * * * *

Foot-and-Mouth Disease. *Gloucestershire.*—A further outbreak occurred in the Gloucestershire area referred to in the last issue of the *Journal*, disease being confirmed on 20th February at Bourton-on-the-Water, seven miles from Northleach. This necessitated an extension of the prohibited area but there has been no further development since that date, and the prohibition of movement restrictions now apply only to two small areas in the vicinity of the outbreaks at Northleach and Bourton-on-the-Water.

Derbyshire.—On 6th March, disease was found to exist on premises at Holymoorside near Chesterfield, four cows being affected out of a total stock of twelve cattle and seven pigs. The usual restrictions were imposed in respect of the area within a radius of fifteen miles of the infected place. No origin can be assigned for the outbreak, from which there has up to the present been no spread. The area under restrictions has now been reduced to one of approximately five miles from the infected premises.

Rabies in Ireland. **Dogs from Ireland to undergo Quarantine.**—In view of the confirmation of the existence of Rabies in a cat at Newcastle, Co. Down, Ireland, the Ministry has issued an Order, the effect of which is to apply the provisions of the Importation of Dogs Order of 1914, and the Importation of Dogs (Amendment) Order of 1918 (No. 2) to all dogs imported into Great Britain from Ireland.

These Orders prohibit the landing of imported dogs in this country except with a licence of the Ministry and then only on the condition that the dog is removed forthwith to veterinary premises approved by the Ministry and specified in the licence, for detention and isolation thereon for a period of six calendar months.

The Order applies to all classes of dogs and no exception therefrom can be made. Full particulars of the regulations and copies of the prescribed form of application can be obtained on application to the Secretary, 4, Whitehall Place, London, S.W.1.

* * * * *

QUESTIONS IN PARLIAMENT.

Land Drainage for the Relief of Unemployment.—In reply to a question by Mr. Wright, the Minister of Agriculture stated in the House of Commons on the 9th March that the Ministry had, since the 1st October last, been initiating drainage schemes for the relief of rural unemployment all over the country. Up to date, 469 schemes, exclusive of 110 water supply schemes, had been approved, and, according to the latest complete returns, for the week ending 24th February, 1923, over 6,000 men were employed. But for the recent bad weather, which has held up schemes in many places, a far larger number of men would have been at work.

Rural Telephones.—The Postmaster-General, Sir W. Joynson-Hicks, in reply to a question by Mr. Foot on the 13th March, said that since the 1st May, 1922, about 3,100 rural party line subscribers had been connected with the system and 85 exchanges and about 650 call offices had been opened in rural areas. In addition, a large number of exchanges and call offices were in course of completion.

Land Settlement.—In reply to a question asked in the House of Commons on the 5th March by Mr. Short, the Minister of Agriculture made the following statement:—

"The total number of ex-service men and others who have been settled on small holdings or upon the land in England and Wales since the inauguration of the Land Settlement Scheme is 19,112, in addition to which it is estimated that a further 1,422 will ultimately be settled on lands already acquired for small holdings but not yet equipped. The net total cost of acquisition of lands to date, including purchase price and legal expenses, etc., is approximately £9,965,000, and the estimated total cost of equipping the land is about £5,917,000. I have no complete record up to date of the number of settlers who have failed, but it is believed that the proportion of failures on the schemes provided by local authorities is not more than 5 per cent. The bad seasons and the agricultural depression have, unfortunately, placed small-holders, in common with all agriculturists, in an exceedingly difficult position, but, although it is too early to draw any general conclusion, the present indications are that the majority of the men settled will succeed in making a satisfactory livelihood."

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REPLIES TO CORRESPONDENTS.

White and Yellow Maize.—B.Y. asks for information as to the feeding values of white and yellow maize meal.

Reply: A note on the subject in this *Journal* (August, 1922, p. 473) refers to American experiments, which tended to show that when white maize is fed the remaining ration should contain a sufficiency of the fat-soluble A Vitamin.

Another correspondent was referred, for an account of these experiments, to Wisconsin Experimental Station Bulletin No. 339 (Annual Report of the Director, 1920-21) and to Hoard's Dairyman, May 5th, 1922.

Requirements of Dairy Cows.—C.X. wishes to know acreage required, quantity of roots, and feeding generally for a cow.

Reply: A copy of Leaflet No. 388 on the Feeding of Dairy Cows was sent and correspondent informed that on an average mixed farm a dairy cow requires per annum:— $1\frac{1}{2}$ acres pasture, 3 cwt. hay, 27 cwt. straw, 85 cwt. roots and 17 cwt. cake and corn.

Palm Kernel Meal.—D.W. asks the difference between palm kernel cake meal and palm kernel meal.

Reply: Palm kernel cake meal is ground palm kernel cake, whereas palm kernel meal is the product resulting from benzine-extracted ground palm kernels. As a food for pigs it is best to use palm kernel cake meal.

Cod Liver Oil.—E.V. asks for information as to feeding cod liver oil.

Reply: The use of cod liver oil for calf rearing is referred to in Leaflet No. 142. With cattle it should be remembered that the total fat ration should not exceed 1 lb. daily for every 1,000 lb. live weight. Accordingly, if cod liver oil is fed, regard must be had to the amount of oil which already forms part of the ration.

Lucerne Growing.—F.U. asks about Lucerne and says that the usual method in the district (borders of Essex and Herts) is to drill in rows 6 in. apart on top of winter corn in April.

Reply: Leaflet No. 160 recommends, as a general rule, sowing without a nurse crop. It is essential, of course, that the land be thoroughly clean, and if this condition be fulfilled, there should be no objection to the local practice being continued. Many growers in Essex, however, prefer to sow the crop alone in July after an early summer fallow.

Tobacco in Great Britain.—G.T. asks about tobacco growing in this country.

Reply: Experiments, first instituted in 1911 in 27 counties, have shown that a class of leaf suitable for blending can be produced in England. Climatic conditions suggested that pipe or cigar tobacco of the French type would be the easiest to grow. Trials proved this to be correct, but it was found that a higher price could be obtained for bright tobacco, and curing experiments were instituted to determine whether this could be produced. It had formerly been thought impossible to produce bright tobacco in a northern climate, but the experiments were, from a technical point of view, successful, although financially little can be said at present.

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NOTICES OF BOOKS.

Farm Lands Available for Settlement.—(48 pp.) U.S. Department of Agriculture: Farmers' Bull. No. 1,271.) This bulletin gives particulars of the various parts of the United States where farm lands are still open for settlement and summarizes some of the more important facts concerning them with a view to supplying the prospective settler with initial information regarding the conditions he may expect to meet, the types of farming prevailing in the different districts and the agencies to which he may apply for further guidance. The conclusion is that "the undeveloped land now available for settlement in the United States can be brought under cultivation only at gradually increasing cost and effort, and in many cases with comparatively small returns from the land itself. The era of free first-class land in the United States has passed, and with its passing has come an increase in the

value of all land. The prospective purchaser in a developed region pays a higher money value for his farm than formerly. The prospective settler in an undeveloped region takes relatively poorer land, works longer to acquire ownership, and in many cases must be content with a less productive farm than was the case with the earlier settlers. However, as population increases, the demand for improved land will inevitably call for the development of large portions of the land now lying idle. The settler first on the ground has the choice of the best land remaining."

Texas Agricultural Experiment Station.—Bull. 295: Correlation between External Body Characters and Annual Egg-Production in White Leghorn Fowls. (14 pp.) Brazos County, 1922. In view of recent criticisms of the methods of judging at Utility Shows and the present controversy on the merits of the handling system, this bulletin is particularly interesting. One hundred and twenty-eight S.C. White Leghorn Pullets of similar breeding hatched in February and March, 1920, constituted the stock used in this study. The egg-production of each bird from 1st October, 1920, to 30th September, 1921, was recorded. At the end of this laying period the birds were weighed; measurements were taken of the length of keel, width of pelvic arch, capacity (measurement from one pelvic bone to end of breastbone), and depth of body; observations were made on the colour of the shanks and beak, pliability of pelvic bones, and handling quality (texture of skin); and the number of primary wing feathers moulted was determined. The tabulated results are stated to show a large correlation between annual egg-production and the physiological characters. The anatomical characters (weight of fowl, width of pelvic arch, capacity, depth of body, and length of keel) show no distinctly significant correlation with annual egg-production. The conclusion drawn by the author is that "in common culling practices, much more emphasis should be placed upon the physiological characters than upon the anatomical ones."

An Investigation into the Frequency and Relative Importance of the most Important Weeds in Sweden. (A Report by Mr. Pehr Bolin, Chief Assistant of the Department for Plant Cultivation of the Swedish Agricultural Experimental Station.)—The Department has made an investigation into the occurrence and importance of the various weeds in different parts of the country. The investigation has been carried out mainly by means of inquiry forms which have been distributed to a great number of farmers throughout Sweden, generally five farmers at least in every parish. The answers have been grouped according to a division of the country into geographical squares, each of 64 square miles (Swedish miles). Further calculations have been made as to the occurrence of each of the different weeds and their injurious influence in the several regions. On the basis of this calculation, a map has been drawn up for each of 38 separate weeds, with the regions marked in 10 different colours according to the occurrence and relative importance of the weeds. Thus, on these maps each region has a colour corresponding to the information, given in the answers, regarding the occurrence of some special weed in that part. The author's own observations and investigations in different parts of the country have also to some extent served as a guide in deciding the colours of the maps.

Based upon these investigations an approximate estimate of the relative importance of the different weeds has been made in two tables. These are

calculated on the average for (1) the whole country; (2) the South of Sweden; (3) Middle Sweden; (4) the lower part of Norrland; (5) the upper part of Norrland; and (6) the eastern and western parts of the South and the Middle of Sweden.

The tables show that the same plant plays a very different rôle as a weed in various parts of the country. *Cirsium arvense* (Creeping Thistle) and *Tussilago Farfara* (Coltsfoot) are, for instance, still of comparatively small importance in the upper part of Norrland, where, on the other hand, for example, *Spergula arvensis* (Spurrey), *Stellaria media* (Chickweed) and *Ranunculus repens* (Creeping Buttercup) occur comparatively more frequently than in the rest of the country. *Taraxacum officinale* (Dandelion) is a worse weed in the eastern than in the western provinces of the middle and southern parts of Sweden, whereas *Rhinanthus major* (Yellow Rattle) and *Chrysanthemum segetum* (Corn Marigold) are most numerous in the western parts.

In commentaries to each map the author discusses the probable reasons for the differences in the occurrence of the same species of weed.

A Milk Goat for Every Backyard.—(Special Pubn. No. 27, Californian Department of Agriculture, Sacramento.) The preface states that this booklet is published to meet a demand, and that since 1910 the number of milk goats in the United States has increased from 8,000 to well over 100,000. The State Department of Agriculture suggests that the man of little means may own one or two goats and that by so doing his family will gain by using more and better milk.

In California the Authorities in most towns realise the need of greater consumption of milk, and place no restriction, save simple sanitary ones, on the keepers of goats up to two in number. Three or more goats constitute a dairy, in which case a permit is needed and rules governing the sale of milk must be observed. Advice on the purchase of goats is given in the booklet. Plans and details are given of a goat dairy and house to hold two goats and their food, and also a diagram of a new type of hay rack for feeding two goats without waste. Methods of keeping milk clean, and of sterilization and cooling, suitable for goat dairies, are explained.*

1. *Alimentation Rationnelle des animaux domestiques* (403 pp.). 2. *Les aliments du bétail* (356 pp.). (Raoul Gonnin, Paris: J. B. Baillière et Fils, 1922). 10 francs each. These two volumes constitute an important contribution to the general agricultural literature dealing with the nutrition of farm animals. In the first volume, the author deals with the different scientific feeding systems, and then proceeds to deal in detail with the nutritive value of all feeding stuffs in general use in French agricultural practice. The latter half of the first volume deals with the general effects of poisons introduced through feeding stuffs, and the common poisonous plants.

The second volume begins with a general treatise on animal nutrition, and is followed by practical advice on the feeding of horses, calves, milch cows, bullocks, sheep, goats and pigs. For those who can read French and who wish to extend their knowledge of feeding methods, these books may be strongly recommended.

* [For information on goat keeping in England see Leaflet 306, *The Goat as a Source of Milk*; Leaflet 383, *Hints on Goat Keeping*; Plans of a Goat House, price 3d. post free. From the Ministry of Agriculture, Whitehall Place, S.W.1.]

ADDITIONS TO THE LIBRARY.

Agriculture, General and Miscellaneous.

Aberdeen and North of Scotland College of Agriculture.—The Rowett Institute, Bucksburn, Aberdeen. [Origin, Development and Nature of Institute, Description of Buildings and Lands, and First Report on Work covering the period April—October, 1914 and 1919-22.] (94 pp.) Aberdeen, 1923, 1s. [37(072).]

Orwin, C. S.—Farm Costing and Accounts. (31 pp.) [Successful Farming Series.] London: Benn Bros., Ltd., 1923, 1s. 6d. net. [657(04).]

Rhode Island Agricultural Experiment Station.—Bull. 188:—The Substitution of Stable Manure by Fertilizers, Green Manures and Feat. (23 pp.) Kingston, 1922. [63.16(04).]

International Seed Testing Conference.—Report of the Discussions at the Third International Seed Testing Conference, Copenhagen, June 6-10, 1921. (185 pp.) Copenhagen: Conference Press, 1922. [63.1951.]

Field Crops.

Australia Institute of Science and Industry.—Bull. 23:—A Classification and Detailed Description of the Oats of Australia. Being the Third Report of the Special Committee on Seed Improvement. (31 pp.) Melbourne, 1922. [63.314.]

Piper, C. V., and Morse, W. J.—The Soybean. (329 pp.) New York and London: McGraw-Hill Book Co., Ltd., 1923, 20s. net. [63.321.]

University College of North Wales.—i. Experiments with Oats, 1922: (a) Varieties; (b) Test of "Corn Covers." ii. Production of Seed Oats in North Wales. (15 pp.) Bangor, 1923. [63.314; 63.198.]

University of Leeds and the Yorkshire Council for Agricultural Education.—Bull. 126:—Variety Trials of Potatoes in Yorkshire, 1922. (4 pp.) Leeds, 1922. [63.512(04).]

Gilchrist, D. A.—Seeds Mixtures and the Improvement of Grass Land. Being an address delivered at the Plymouth Show of the Bath and West and Southern Counties Society, 1922. (12 pp.) Bath: Herald Press, 1922. [63.33(a).]

Miles, G. P.—The Romance of Wild White Clover. (8 pp.) Notes on Wild Red Clover. (4 pp.) Home-Grown Grass Seeds. Second Edition. (8 pp.) Warrington: Gartons, Ltd., 1923. [63.31(b); 63.1951.]

Horticulture and Fruitgrowing.

Allen-Brown, A. & D.—The Violet Book. (94 pp. + 10 coloured plates.) Taunton: Barnicott & Pearce (Wessex Press), 1922, 6s. 6d. post free. [63.59.]

Gardner, V. R., Bradford, F. C., and Hooker, H. D.—The Fundamentals of Fruit Production. (686 pp.) New York and London: McGraw-Hill Book Co., 1922, 22s. 6d. [63.41(02).]

Plant Pests and Diseases.

U.S. Department of Agriculture.—Farmers' Bull. 1270:—The More Important Apple Insects. (95 pp.) Washington, 1922. [63.27-41.]

Cornell Agricultural Experiment Station.—Bull. 410:—Studies on Insects Affecting the Fruit of the Apple, with particular reference to the characteristics of the resulting Scars. (pp. 447-498 + plates iv-xlii.) Ithaca, 1922. [63.27-41.]

Ricebuck, A.—Insect Pests and Fungus Diseases of Farm Crops. (55 pp.) [Successful Farming Series.] London: Benn Bros., Ltd., 1923, 2s. net.

Wageningen Landbouwhoogeschool.—Mededeelingen, Deel 26. Verh. 1:—A Study into the Literature on Stipple-Streak and Related Diseases of Potato. (52 pp.) Wageningen, 1922. [63.23.]

Live Stock and Feeding Stuffs.

Potts, H. W.—Pigs and their Management. Fourth Edition Revised. (230 pp. + 76 plates.) Sydney, N.S.W.: Angus & Robertson, Ltd., 1923, 12s. 6d. [63.64(02).]

Lovejoy, A. J., and Edward, J. M.—Hogs: A Practical Book for the Pure Bred Swine Breeder and Farmer. (312 pp.) Chicago: First Publishing Co.; South Godstone, Surrey: T. A. Stephens, 1919, 5s. 6d. [63.64(02).]

Halman, E. T.—Animal Nutrition. (52 pp.) [Successful Farming Series.] London: Benn Bros., Ltd., 1923, 2s. net. [63.6048(04).]

University of Leeds and the Yorkshire Council for Agricultural Education.—Bull. 73 (Sixth Revision):—Composition, Nutritive and Manurial Values of Farm Foods. Leeds, 1923. [63.60433.]

Dairying.

Cornell Agricultural Experiment Station.—Bull. 409:—An Economic Study of Dairying on 149 Farms in Broome County, New York. (271—443 pp.) Ithaca, 1922. [63.7(73).]

New York Agricultural Experiment Station.—Technical Bull. 89:—Review of the Bacteriological Aspects of Cheese Ripening, with Bibliography. (36 pp.) Geneva, 1922. [576-8: 7.]

National Milk Conference.—Report of the Proceedings of the National Milk Conference held in the Council Chamber of the Guild Hall on October 16th, 17th and 18th, 1922. (222 pp.) London: National Clean Milk Society, 1923, 3s. [63.71; 614.32.]

Veterinary Science.

University of Leeds and the Yorkshire Council for Agricultural Education.—Bull. 127:—Parasitic Gastritis or "Drying" in Lambs. (11 pp.) Leeds, 1923. [619.3.]

Wisconsin Agricultural Experiment Station.—Research Bull. 55:—An Experimental Study of Infectious Abortion in Swine. (35 pp.) Madison, 1922. [619.4.]

Poultry and Bees.

Hookey, Will.—Poultry-Craft. A Manual for Instructors, Students and all Poultry Keepers. Being an Exposition of Applied Science Combined with Practical Experience as Relating more especially to the Utility Problems of Poultry Culture (excluding Bantams and Caponising.) (xix + 473 pp.) London: Poultry Press, 1923, 15s. net. [63.65(02).]

Brown, Edward.—Poultry Keeping on the Farm. (54 pp.) [Successful Farming Series.] London: Benn Bros., Ltd., 1923, 2s. net. [63.65(04).]

Punnett, R. C.—Heredity in Poultry. (204 pp.) London: Macmillan & Co., 1923, 10s. net. [575-1; 63.65(02).]

Edwardes, Tickner.—Bee-Keeping for All: A Manual of Honey-Craft. (136 pp.) London: Methuen & Co., 1923, 3s. 6d. net. [63.81(02).]

Machinery.

University of Leeds and the Yorkshire Council for Agricultural Education.—Bull. 125:—The Use of Implements in the Lifting of the Potato Crop, 1921. (87 pp.) Leeds, 1922, 2s. 6d. [31.17(04).]

Deutsche Landwirtschaft-Gesellschaft.—Arbeiten 320:—Hauptprüfung der Kleindrillmaschinen Bodenbearbeitungsgeräte für Wein- und Obstbau Kartoffelsichtmaschinen. (88 pp.) Berlin, 1922. [63.17(04).]

Bond, J. R.—Farm Implements and Machinery. (282 pp.) London: Benn Bros., Ltd., 1923, 35s. net. [63.17(02).]

Highland and Agricultural Society of Scotland.—Demonstration of Farm Tractors and Tractor Implements at Fordel, Dalkeith, Midlothian, October 17th—20th, 1922. (74 pp.) Edinburgh and London: W. Blackwood and Sons. [63.175(04).]

Economics.

Strickland, C. F.—Studies in European Co-operation. (166 pp.) Lahore: Government Printing; London: Constable, 1922, 4s. 8d. [334(4).]

Darling, M. L.—Some Aspects of Co-operation in Germany, Italy and Ireland. Lahore: Government Printing; London: Constable, 1922, 5s. 3d. [334(415); 334(43); 334(45).]

Macklin, T.—Efficient Marketing for Agriculture: its Services, Methods and Agencies. (418 pp.) New York and London: Macmillan Co., 1922, 12s. 6d. [381.]

Smith, J. G.—Organised Produce Markets. (238 pp.) London: Longmans, Green & Co., 1922, 12s. 6d. net. [381.1.]

U.S. Department of Agriculture.—Farmers' Bull. 1265:—Business Methods of Marketing Hay. (25 pp.) Washington, 1922. [63.1982.]

League of Nations.—Provisional Economic and Financial Committee (Economic Committee). Report on Certain Aspects of the Raw Materials Problem (with the relevant documents submitted to the Committee by Professor Gini). Vols. 1 and 2. (55 and 175 pp.) Geneva, 1922. [31(00); 338.9.]

[Contains Statistical Statements on Cereals, Wool, Cotton and Fertilisers.]

- Webb, S. and B.*—English Local Government: Statutory Authorities for Special Purposes. (521 pp.) London: Longmans, Green & Co., 1922, 25s. net. [336.28.]
- International Institute of Agriculture.*—The Maintenance of the Agricultural Labour Supply in England and Wales during the War, by *J. K. Montgomery*. (121 pp.) Rome: International Institute of Agriculture; London: Ministry of Agriculture and Fisheries, 1922, 2s. 6d. [331: 63(08).]
- Mitchell, E. L.*—The Law of Allotments and Allotment Gardens (England and Wales). Third Edition. (147 pp.) London: P. S. King & Son, 1922, 7s. 6d. [347(b).]
- Scottish Board of Health.*—Inter-Departmental Committee on the Laws, Regulations and Procedure Governing the Sale of Milk in Scotland. Report. (127 pp.) [Cmd. 1749.] 3s. net. Minutes of Evidence and Appendices. (323 pp.) 30s. net. London: H.M. Stationery Office, 1922. [614.32.]
- Grange, H.*—Wheat Costings 1914 and 1919–22: Showing the Cost of Wheat Production in each Year and a Method of Ascertaining the Cost of Corn-growing in any Year. (16 pp.) London: P. S. King & Son, 1922, 1s. 6d. [61.31: 31.]
- Bulkeley, M. E.*—Bibliographical Survey of Contemporary Sources for the Economic and Social History of the War. [British Series Economic and Social History of the World War, published on behalf of the Carnegie Endowment for International Peace.] (xix + 648 pp.) Oxford: Clarendon Press, 1922, 10s. 6d. [01: 63(08).]
- [This is a Bibliographical Survey of the literature dealing with the Economic and Social History of the United Kingdom during the War and Reconstruction periods. Speaking generally it contains only British publications, though a few American and foreign books are included. The nine main sections into which it is divided are: Social Conditions; Administration; Industry and Commerce (including Agriculture and Food Supply); Transport; Labour; Army and Navy; Finance; Prices and Cost of Living, Miscellaneous.]
- Board of Agriculture for Scotland.*—Report on the Financial Results of Sixty-five Farms for the Period Martinmas, 1919, to Whitsunday, 1921, and on the Cost of Production of 1920 Crops and of Milk. (30 pp.) Edinburgh: H.M. Stationery Office, 1922, 3s. 6d. net. [338.58: 63.714.]
- Drorak, L. F.*—La Co-operation dans la République Tchecoslovaque. (125 pp.) Prague: Union Central des Co-operatives Agricoles, 1922. [334 (950).]
- U.S. Department of Agriculture.*—Bull. 1106:—Legal Phases of Co-operative Associations. (74 pp.) Washington, 1922. [334 (06).]
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- Phillips, R. G., and Fraser, S.*—Wholesale Distribution of Fresh Fruits and Vegetables, being in part the results of a Survey of Wholesale Distribution made by the Joint Council of the National League of Commission Merchants of the United States, the Western Fruit Jobbers' Association of America and the International Apple Shippers' Association for the Season 1920–21. (256 pp.) Rochester, N.Y.: The Joint Council, 1922. [381.]
- U.S. Department of Agriculture.*—Bull. 1124:—The Marketing of Mill Feeds. (20 pp.) Washington, 1922. [381.]
- U.S. Department of Agriculture.*—Bull. 1083:—Farm and Terminal Market Prices: Wheat, Corn and Oats, Crop Movement Year 1921–22. (58 pp.) Washington, 1922. [238.5: 381.]
- U.S. Department of Agriculture.*—Farmers' Bull. 1250:—The Bulk Handling of Grain. (22 pp.) Washington, 1922. [63.31-198.]
- U.S. Federal Trade Commission.*—Report on Methods and Operations of Grain Exporters. Vol. i.—Inter-relations and Profits. (123 pp.) Washington, 1922, 15 cents. [63.31: 38.]
- Kansas State Board of Agriculture.*—Report for Quarter ending June, 1922, devoted to Co-operation in Marketing Kansas Wheat. (133 pp.) Topeka, 1923. [63.311: 38: 334.6.]

